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**Final Technical Report**  
**November 1995**



# **ADVANCED SIGNAL PROCESSING SYSTEM (ASPS) PERFORMANCE ASSESSMENT**

**HRB Systems, Inc.**

**Dr. Susan Handy and Michael Gladd**

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APPROVED: *Francesca Tandi Paugh*

FRANCESCA TANDI PAUGH  
Project Engineer

FOR THE COMMANDER:

*Delbert B. Atkinson*

DELBERT B. ATKINSON, Colonel, USAF  
Director of Intelligence & Reconnaissance

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13. ABSTRACT (Maximum 200 words) This report summarizes the work done on the Advanced Signal Processing System (ASPS) performance assessment study, performed for Rome Laboratory/IRAE and the Foreign Aerospace Science and Technology Center/DXS of the United States Air Force. The study measured the performance of off-the-shelf technology proposed in the ASPS architecture, including supercomputer based DSP processing linked to a workstation based visual display over a fiber optic (FDDI) network. All processing threads were developed using DSP and visual processing toolkits for flexibility and future expandability. It should be noted that the Foreign Aerospace Science and Technology Center has since been renamed the National Air Intelligence Center (NAIC).				
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## **1.0        INTRODUCTION**

### **1.1        Background**

HRB Systems conducted a Phase I Study for the FASTC Advanced Signal Processing System (ASPS). An architecture for the ASPS was defined based on the signal processing workload and the following criteria:

1.     The system must be able to process most ELINT, TELINT, and PROFORMA signals.
2.     The system must adapt to rapid changes in signals, environments, and targets.
3.     The system must transparently exploit developments in technology.

The architecture involves the use of leading edge, off-the-shelf technology in an attempt to support the projected signal processing workload. It must also provide an expandable and maintainable open system architecture.

The purpose of the ASPS Performance Assessment was to assess the performance of the off-the-shelf products included in the ASPS architecture. The goal was to determine if the products can perform as needed to support the anticipated ASPS signal processing workload. Each component of the ASPS architecture was assessed. This analysis will establish a framework for future expansion and provide the customer with the tools and information to maximize the utilization of their facilities.

### **1.2        Program Requirements**

The following requirements are drawn from the ASPS Performance Assessment Statement of Work:

#### I/O Threads:

- Develop functional threads to evaluate transfer of data between the graphics workstation and supercomputer.
- Parameters measured to include:
  - Disk to disk transfer speed
  - Memory to memory transfer speed
  - Network transfer speed

#### PreScan/Processability Assessment Threads:

- Develop functional threads to provide display capability for intercept processability assessment
- Displays to include:
  - Dual trace oscilloscope
  - Spectrum analyzer
  - Time-time falling raster
  - Time-frequency falling raster

#### Thread Performance Analysis:

- Perform in-depth analysis of processing behavior of the developed threads with respect to the following parameters:
  - Execution time
  - Network transfer rates for both Ethernet and FDDI networks
  - CPU utilization
  - Processing rates for each portion of a thread (disk, memory, DSP, and visual speeds)

#### Thread Deployment:

- Integrate developed threads into FASTC Convex facility and demonstrate performance analysis results.

#### Documents:

- Prepare a system integration plan to install the equipment and integrate with the FASTC Convex.
- Prepare a User's Guide to document how to use the developed threads.
- Prepare a Final Technical Report document the performance measurements and assessments.

### **1.3 Toolsets**

The following software products were used in assessing the performance of the ASPS architecture:

- ESY DSP - The ESY DSP System (formerly MoSES) was used to develop input/output and signal processing threads. ESY DSP integrates the Signal Processing WorkSystem (SPW) package, used to build DSP flows, with the Application Visualization Systems (AVS) package, used to construct the visual displays (oscilloscope, spectrum analyzer, time-time falling raster and time-frequency falling raster). For purposes of this study, timing hooks were placed in the code to report performance timing.

- SunNet Manager - The Sun Network Manager package was used to manage and monitor the network. Software agents provided data on disk, CPU, memory and network usage. The manager was used to collect and display this data for a generalized picture of test performance.

#### 1.4 Hardware

The following hardware platforms were used in assessing the performance of the ASPS architecture:

- Convex 3820 equipped with two CPUs with a peak performance capacity of 240 Million Floating Operations Per Second (MFLOPS)
- Cray Y-MP EL equipped with four CPUs with a peak performance capacity of 532 MFLOPS. The test runs reported in this analysis were made with two CPUs for comparison to the Convex (peak capacity of 266 MFLOPS).
- Two Sun IPX workstations.

The systems were linked together in a network using both Ethernet and FDDI connections.

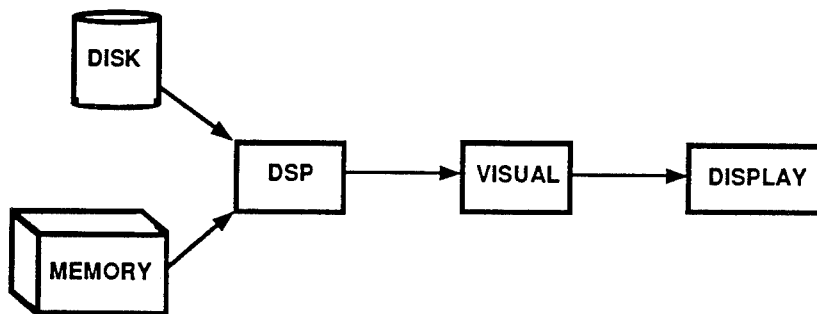
### 2.0 METHODS

#### 2.1 Fundamental Data Flow

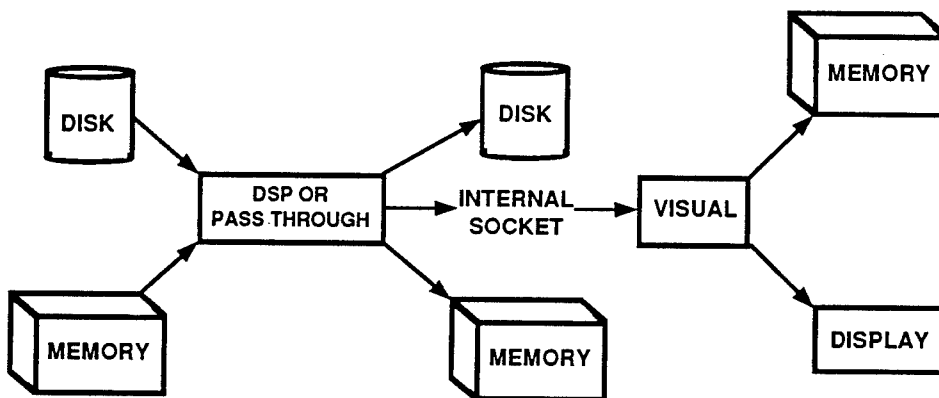
The fundamental signal processing flow consists of reading data from disk or memory, applying the DSP algorithms, applying the visual transformations and displaying the data (shown in Figure 2.1-1). For ASPS Performance Assessment, this processing flow was broken down into steps which were individually timed. For example, during standalone testing various combinations of data flow subsets were tested. The following is a sample of some of the combinations tested:

- Disk --> DSP --> Disk
- Disk --> DSP --> Memory
- Memory --> DSP --> Disk
- Memory --> DSP --> Memory

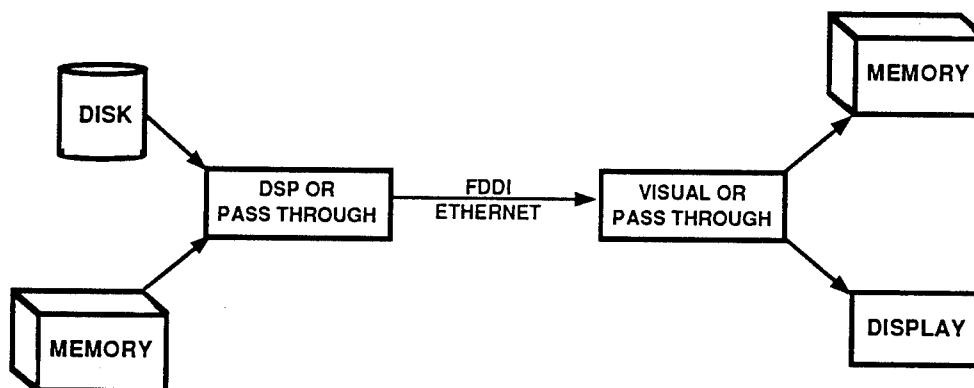
and:



**FUNDAMENTAL SIGNAL PROCESSING FLOW**



**STANDALONE PERFORMANCE TESTING**



**NETWORKED PERFORMANCE TESTING**

Figure 2.1-1 Signal Processing Data Flow

- Disk --> Visual --> Memory
- Disk --> Visual --> Display
- Memory --> Visual --> Memory

and finally:

- Disk --> DSP --> Socket --> Visual --> Memory
- Disk --> DSP --> Socket --> Visual --> Display
- Memory --> DSP --> Socket --> Visual --> Display

Some cases eliminated the DSP processing and passed data through so timing data could be gathered on simple disk-to-disk and memory-to-memory transfers.

By gathering and analyzing the times for these various tests, processing times were calculated for each step in the data flow, thus identifying any bottlenecks.

Since each test level contained a number of combinations, shell scripts were used to drive each test and streamline the required test operator interaction. Each test was run several times to produce a valid average performance. Procedures for executing each test along with instructions on how to use the visualization threads and SunNet Manager are provided in the User's Manual.

## 2.2 Test Data Flow Generation

ASPS performance assessment assessed throughput for the following configurations:

- Standalone Sun
- Standalone supercomputer (Cray or Convex)
- Sun --> Network --> Sun (using Ethernet and FDDI)
- Supercomputer--> Network --> Sun (using Ethernet and FDDI)

Standalone testing was used to isolate timing for disk and memory transfers as well as DSP and visual processing. Running the tests over the network verified the impact of transferring data over either FDDI or Ethernet. Comparing performance for the various tests made it possible to identify bottlenecks in the data flow. A final test was run to verify there are no problems associated with more than one thread running at a time.

Figures 2.2-1 and 2.2-2 depict sample test matrices that were used for the

SAMPLE STANDALONE TEST MATRIX

TEST CLASS	CASE #	TEST CASE	PARAMETER MEASURED	DERIVED	PREDICT	ACTUAL MSAMPS	AVG. TIME	AVG. MSPS	AVG. MBPS	EXPLAIN
DSP Controls	101	Mem-NULL-Mem	Memory Speed	C101	None					
	102	Disk1-NULL-Mem	Disk Read Speed	C102	None					
	103	Mem-NULL-Disk2	Disk Write Speed	C103	None					
	104	Disk1-NULL-Disk2	Disk Read/Write Speed	C104	~C102+C103-C101					
DSP Tests	105	Mem-DSP-Mem	DSP Speed	C105	None					
	106	Disk1-DSP-Mem	DSP Speed	C106	~C105+C102					
	107	Mem-DSP-Disk2	DSP Speed	C107	~C105+C103					
	108	Disk1-DSP-Disk2	DSP Speed	C108	~C105+C104					
VIS Controls	109	Mem-NULL-Mem	Memory Speed	C109	~C101					
	110	Disk1-NULL-Mem	Disk Read Speed	C110	~C102					
	111	Mem-NULL-Display	Display Write Speed	C111	None					
	112	Disk1-NULL-Display	Display Write Speed	C112	~C111+C102					
VIS Tests	113	Mem-VIS-Mem	VIS Speed	C113	None					
	114	Disk1-VIS-Mem	VIS Speed	C114	~C113+C109					
	115	Mem-VIS-Display	VIS Display Speed	C115	~C113+C102					
	116	Disk1-VIS-Display	VIS Display Speed	C116	~C115+C101					
DSP-VIS Control	117	Mem-NULL-Sckt-NULL-Mem	Memory-Memory Speed	C117	None					
	118	Disk1-NULL-Sckt-NULL-Mem	Disk-Memory Speed	C118	~C117+C102					
	119	Mem-NULL-Sckt-NULL-Display	Memory-Display Speed	C119	~C117					
	120	Disk1-NULL-Sckt-NULL-Display	Disk-Display Speed	C120	~C118					
DSP-VIS Tests	121	Mem-DSP-Sckt-VIS-Mem	DSP-VIS Speed	C121	~C117-C105					
	122	Disk1-DSP-Sckt-VIS-Mem	DSP-VIS Speed	C122	~C121					
	123	Mem-DSP-Sckt-VIS-Display	DSP-VIS Speed	C123	~C121					
	124	Disk-DSP-Sckt-VIS-Display	DSP-VIS Speed	C124	~C121					
			Averaged Memory Speed		(MBPS)					
			Averaged Disk Read Speed		(MBPS)					
			Averaged Disk Write Speed		(MBPS)					
			Averaged DSP Speed		(MBPS)					
			Averaged VIS Speed		(MBPS)					

Figure 2.2-1

# SAMPLE NETWORKED TEST MATRIX

TEST CLASS	CASE #	TEST CASE	PARAMETER MEASURED	DERIVED	PREDICT	MSAMPS	TIME	MSPS	MBPS	EXPLAIN
DSP-VIS Control	401	Mem-NULL-Net-NULL-Mem	Network Speed	C401	~C117					
	402	Disk1-NULL-Net-NULL-Mem	Disk Network Speed	C402	~C118					
	403	Mem-NULL-Net-Null-Display	Network-Display Speed	C403	~C401					
	404	Disk1-NULL-Net-NULL-Display	Disk-Network-Display Speed	C404	~C402					
DSP-VIS Tests	405	Mem-DSP-Net-VIS-Mem	DSP-VIS Speed	C405-C401	~C121					
	406	Disk1-DSP-Net-VIS-Mem	DSP-VIS Speed	C406-C402	~C122					
	407	Mem-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C407-C401	None					
	408	Disk1-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C408-C402	~C407					
			Averaged Network Speed		(MBPS)					
			Averaged DSP-VIS Speed		(MBPS)					

Figure 2.2-2



standalone and networked test configurations. These matrices were used to generate the test cases for ASPS performance Assessment and compile the results. Each test case was run with three different buffer sizes to assess performance impact (256, 16K, and 128K). Networked test cases were run both with Ethernet and FDDI.

Test cases containing distributed processing (distributed cases contain separate DSP and visual modules which communicate via sockets) were run both synchronously and asynchronously. Synchronous processing means the DSP module and the visual module processed every buffer of data. Asynchronous processing means the DSP module only passed data to the visual module when the visual module was ready to accept it. If the visual module was not ready for a buffer of data, it was dropped. Although the tests were run in the synchronous mode as well as the asynchronous mode, this report will mainly deal with the asynchronous results because that is the most efficient way to run the threads. We have included a sample set of synchronous runs in Appendix B for comparison purposes.

### 2.3 Test Data Flow Execution

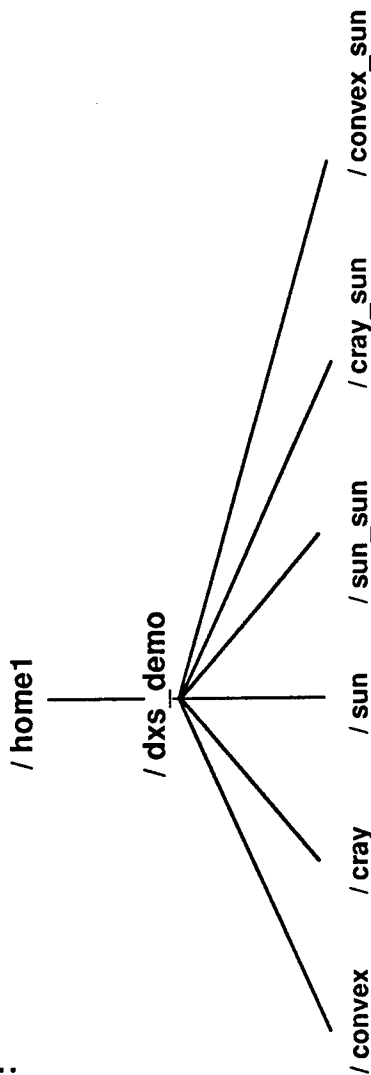
Figure 2.3-1 depicts the ASPS directory structure. The /nets directory contains visual (AVS) co-routines, networks, and scripts. the /bin directory contains executable DSP (SPW) threads and scripts. The /scripts directory contains the overall test scripts, individual test scripts, summary scripts, and graphing scripts. The /logs directory contains the timing results, the SunNet Manager logs, summary reports, and plotting files.

Shell scripts exist to run each set of configuration tests for all buffer sizes, both synchronously and asynchronously. These scripts provide options for specifying the amount of data to be processed and whether or not SunNet manager should be turned on to monitor these tests.

Timers have been placed in each test case to measure the elapsed time for the test, the CPU time used, and the amount of data processed. Distributed test cases were timed by the DSP module since the DSP module will always process the entire amount of data, while the visual module may not receive all buffers in an asynchronous test.

Each test configuration was run a number of times to arrive at representative times for each test case.

# TEST CONFIGURATIONS:



# TEST DIRECTORIES:

- **NETS** AVS COROUTINES, NETWORKS AND SCRIPTS. (xx = test case)
- **BIN** EXECUTABLE SPW THREADS AND COPY SCRIPT. (xx = test case, a = 256, b = 16K, c = 128K buffer size)
- **SCRIPTS** OVERALL TEST SCRIPT, INDIVIDUAL TEST SCRIPT, SUMMARY SCRIPTS, GRAPHING SCRIPTS.
- **LOGS** TIMING RESULTS, SUN NET MANAGER LOGS, SUMMARY REPORTS, PLOTTING FILES. (xx = test case, a = 256, b = 16K, c = 128K buffer size)

Figure 2.3-1 - ASPS Test Directory Structure

## **2.4      Data Collection**

Each test case produced a timing log containing the elapsed times and amount of data processed. These timing logs were examined by a UNIX text processor (NAWK) and a test report was formatted for each configuration. The test results were also formatted and stored into files ready for graphing by AVS. If SunNet manager (SNM) was requested for a test then SNM logs were stored for each test case ready for display or graphing using the SunNet Manager console.

Three test reports (if available) were selected for each test configuration and used to fill in the test matrices. Appendix A contains a listing of each test report that went into the final test matrices. Each test configuration contains a spreadsheet for each buffer size and network configuration run (FDDI and Ethernet, if applicable). The completed spreadsheets are listed in the Results section. The spreadsheets were then condensed to produce a final summary sheet (Section 3.3) for each buffer size which reduced the data to a final set of performance statistics.

## **2.5      Data Analysis**

The test results were analyzed several ways. First the times for each test case in a configuration were compared with the predicted results and any discrepancies were examined and explained. Predicted results are not given as actual times, but rather as functional approximations. For instance, a disk read and disk write should take approximately the same time. Asynchronous times were examined to verify that we were making full use of asynchronous processing. Next, the times for each buffer size were compared to see which buffer size was most efficient. Networked test cases were analyzed for Ethernet vs. FDDI speeds.

In addition to the statistical spreadsheets produced by the test cases, the data was also formatted into files to be plotted by AVS. AVS graphs summarizing the final test matrices are included in the Results section of this report.

The operator can use the SunNet Manager console to call up the SNM test logs for ASCII display or graphing. SunNet manager log files are only available if the test was run with that option turned on. SunNet Manager graphs give a quick indication of disk and CPU activity during the test, but do not provide enough detail to analyze the test cases and therefore were not included in this report.

### 3.0        **RESULTS**

#### 3.1        **Standalone Test Results**

The following considerations should be noted when examining the standalone test results spreadsheets:

- Differences of 10% were allowed in comparing actual results to predicted results due to timing variations from run to run.

- Test cases that failed (due to socket errors) or cases that had abnormally high times (due to contention) were not considered in the average times. Any cases that were excluded are noted in the Explain column of the spreadsheet.

- All Sun cases were run with synchronous disk I/O, and the predictions reflect this fact. The Visual control tests run on the Convex (test cases 9 through 16) also used synchronous I/O so that the code could be shared with Sun cases.

- Because the Cray AVS package was not available during testing, there are no visual test results for the Cray (cases 9 through 24).

- Processing times for the Cray and Convex cases are presented for the 2 CPU runs only. On each machine, we used the system's intrinsic FFT in order to maximize throughput. We compiled each routine on the supercomputer at the highest optimization level. On the Cray, we can compile at the highest level and then set an environment variable at runtime to control the number of CPUs used. On the Convex, the FFT function will automatically use as many CPUs as are available when compiling at this optimization level.

- The reports of the test runs that were used for the spreadsheets are listed in Appendix A. These reports contain the elapsed time and CPU time for each test case. The reports also contain speeds that were calculated on the basis of individual test results (i.e. not averaged using several test cases as the spreadsheets were).

- Averaged speeds (in megabytes per second) presented at the bottom of each spreadsheet were calculated using the following formulas:

$$\begin{aligned} \text{Averaged Memory Speed} &= \text{Total\_mbytes} / (\text{case 1 time}) \\ \text{Averaged Disk Read Speed} &= \text{Total\_mbytes} / (\text{case 2 time}) \\ \text{Averaged Disk Write Speed} &= \text{Total\_mbytes} / (\text{case 3 time}) \\ \text{Averaged DSP Speed} &= \text{Total\_mbytes} / \text{AVERAGE}((\text{case 5 time} - \text{case 1 time}), \\ &\quad (\text{case 6 time} - \text{case 2 time}), \\ &\quad (\text{case 7 time} - \text{case 3 time}), \\ &\quad (\text{case 8 time} - \text{case 4 time})) \\ \text{Averaged VIS Speed} &= \text{Total\_mbytes} / \text{AVERAGE}((\text{case 13 time} - \text{case 9 time}), \\ &\quad (\text{case 14 time} - \text{case 10 time})) \end{aligned}$$

- The memory transfer rates measured by our threads on the Cray and the Convex are below the potential rates achievable on these machines. Even at the largest buffer size, we are not transferring enough data to utilize a significant percentage of the available bandwidth per iteration. On the Convex, these transfer rates are on the order of 500 MBPS per CPU. On the Cray, the transfer rates are on the order of 1000 MBPS per CPU.

- The disk read speeds calculated for the standalone tests are artificially high because of disk caching. UNIX systems will normally cache a disk file read so that if the file is read again the data can be retrieved from cache rather than reading from disk. It was not feasible for us to prevent this caching therefore we allowed it in our tests. The result of disk caching is that the first time you read a disk file it will be much slower than subsequent reads. The times shown on the spreadsheets show the the improved efficiency of caching. For comparison we have included test runs in Appendix B that show true initial file read times. Sample initial read rates for each system (in megabytes per second) are as follows:

Sun disk reads.....1.38 (MBPS)  
 Cray disk reads .....1.48 (MBPS)  
 Convex disk read.....2.17 (MBPS)

### 3.1.1 Sun Standalone Results/Analysis

The points listed below may be referred to when examining the Sun standalone test results spreadsheets which follow. The printed report for each test run that went into the spreadsheet summary can be found in Appendix A. These printed reports contain expanded information about each test, including elapsed time, CPU time, amount of data processed and overall throughput rate for each test. A spreadsheet is presented for each buffer size tested.

#### Notes:

- (1) Synchronous disk I/O was used for the Sun standalone tests because initial tests indicated asynchronous disk I/O would not be of great benefit. However after we optimized the system configuration with additional swap space and shared memory, final tests seem to indicate that we may have benefited from asynchronous disk I/O. Bear in mind though that asynchronous I/O is only beneficial if there is enough background work to keep the CPU busy while I/O is taking place. With the smallest buffer size (256), there is simply not enough work going on and the process will still be stalled waiting for I/O.
- (2) Disk caching resulting in faster read times was observed if the input file had already been by a previous test. We allowed this caching because there was no efficient way to prevent it. This explains why the disk read test was significantly faster than the disk write test.
- (3) When the Sun was stressed with compute intensive (DSP) tests, combined with disk or socket I/O, we consistently saw results where the times for these tests exceeded the sum of the times for separately run DSP and I/O tests. For example the time for a read-DSP-write test exceeded the sum of separately run tests for disk reads, DSP processing and disk writes. Our belief is that these times are due to resource contention and the limited compute power and bus bandwidth on the IPX.
- (4) AVS and its communication between modules imposes a penalty, especially at small buffer sizes and a high number of iterations. We saw excruciatingly high times for the small buffer size when running in our SPL (test cases 115 and 116). However these times decreased dramatically when we ran at FASTC. Our conclusion is that the demo version of AVS installed at FASTC contained efficiency improvements. Because of this dramatic difference, the times seen in our SPL were not considered in the final average for several test cases.

- (5) For test 117, buffer size 256, time 1 was not used in the final average because contention caused an abnormally high elapsed time.

SUN\_STANDALONE (Buffsize 256)

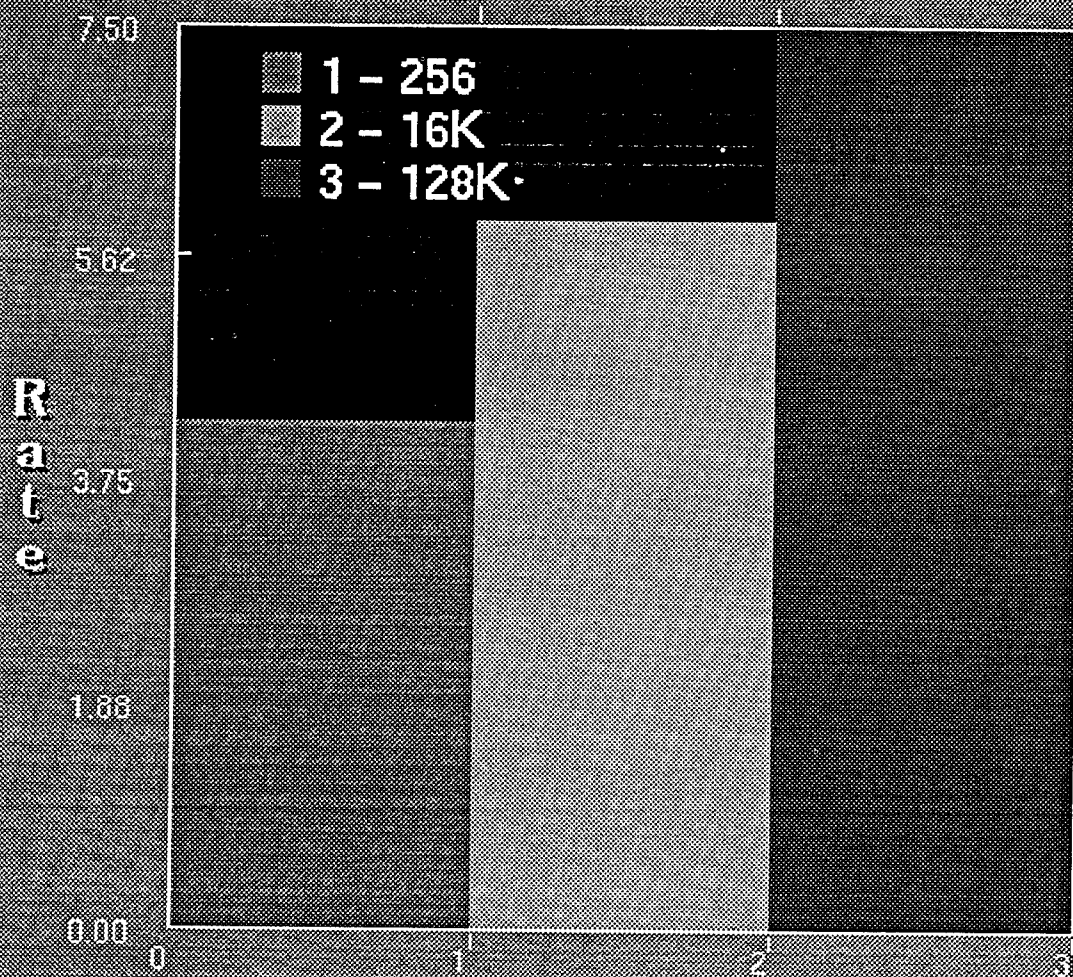
TEST CLASS	CASE #	TEST CASE	PARAMETER MEASURED	DERIVED	PREDICT	ACTUAL MSAMPS	AVG. TIME	AVG. MSPS	AVG. MBPS	EXPLAIN
DSP Controls	101	Mem-NULL-Mem	Memory Speed	C101	None	1.6384	3.10	0.53	4.22	
	102	Disk1-NULL-Mem	Disk Read Speed	C102	None	1.6384	7.31	0.22	1.79	See note 1, note 2
	103	Mem-NULL-Disk2	Disk Write Speed	C103	-C102	1.6384	8.37	0.20	1.57	See note 2
	104	Disk1-NULL-Disk2	Disk Read/Write Speed	C104	-C102+C103-C101	1.6384	9.88	0.17	1.33	See note 1
DSP Tests	105	Mem-DSP-Mem	DSP Speed	C105-C101	None	1.6384	33.68	0.05	0.39	
	106	Disk1-DSP-Mem	DSP Speed	C106-C102	-C105+C102	1.6384	55.89	0.03	0.23	See note 3
	107	Mem-DSP-Disk2	DSP Speed	C107-C103	-C105+C103	1.6384	40.30	0.04	0.33	
	108	Disk1-DSP-Disk2	DSP Speed	C108-C104	-C105+C104	1.6384	62.56	0.03	0.21	See note 3
VIS Controls	109	Mem-NULL-Mem	Memory Speed	C109	-C101	1.6384	20.46	0.08	0.64	See note 4
	110	Disk1-NULL-Mem	Disk Read Speed	C110	-C102	1.6384	23.68	0.07	0.55	
	111	Mem-NULL-Disk2	Display Write Speed	C111	None	1.6384	109.05	0.02	0.12	Trial 1 not used, see note 4
	112	Disk1-NULL-Disk2	Display Write Speed	C112	-C111+C102	1.6384	116.48	0.01	0.11	Trial 1 not used, see note 4
VIS Tests	113	Mem-VIS-Mem	VIS Speed	C113-C109	None	1.6384	36.54	0.04	0.36	
	114	Disk1-VIS-Mem	VIS Speed	C114-C110	-C113-C102	1.6384	39.94	0.04	0.33	
	115	Mem-VIS-Disk2	VIS Display Speed	C115-C101	None	1.6384	45.43	0.04	0.29	Trials 1 and 2 not used, see note 4
	116	Disk1-VIS-Disk2	VIS Display Speed	C116-C102	-C115-C102	1.6384	50.96	0.03	0.26	Trials 1 and 2 not used, see note 4
DSP-VIS Control	117	Mem-NULL-Sckt-NULL-Mem	Memory-Memory Speed	C117	None	1.6384	8.26	0.20	1.59	Trial 1 not used, see note 5
	118	Disk1-NULL-Sckt-NULL-Mem	Disk-Memory Speed	C118	-C117-C102	1.6384	17.24	0.10	0.76	
	119	Mem-NULL-Sckt-NULL-Display	Memory-Display Speed	C119	-C117	1.6384	6.75	0.24	1.94	
	120	Disk1-NULL-Sckt-NULL-Display	Disk-Display Speed	C120	-C118	1.6384	14.75	0.11	0.89	
DSP-VIS Tests	121	Mem-DSP-Sckt-VIS-Mem	DSP-VIS Speed	C121-C117	-C117+C105	1.6384	104.95	0.02	0.12	See note 3
	122	Disk1-DSP-Sckt-VIS-Mem	DSP-VIS Speed	C122-C118	-C121	1.6384	154.72	0.01	0.08	See note 3
	123	Mem-DSP-Sckt-VIS-Display	DSP-VIS Speed	C123-C119	-C121	1.6384	108.46	0.02	0.12	See note 3
	124	Disk-DSP-Sckt-VIS-Display	DSP-VIS Speed	C124-C120	-C121	1.6384	166.22	0.01	0.08	See note 3
			Averaged Memory Speed		4.22 (MBPS)					
			Averaged Disk Read Speed		1.79 (MBPS)					
			Averaged Disk Write Speed		1.57 (MBPS)					
			Averaged DSP Speed		0.32 (MBPS)					
			Averaged VIS Speed		0.81 (MBPS)					



TEST CLASS	CASE #	TEST CASE	PARAMETER MEASURED	DERIVED	PREDICT	ACTUAL MSAMPS	AVG. TIME	AVG. MSPS	AVG. MBPS	EXPLAIN
DSP Controls	101	Mem-NULL-Mem	Memory Speed	C101	None	1.6384	2.22	0.74	5.91	
	102	Disk1-NULL-Mem	Disk Read Speed	C102	None	1.6384	3.75	0.44	3.50	See note 1, note 2
	103	Mem-NULL-Disk2	Disk Write Speed	C103	-C102	1.6384	8.57	0.19	1.53	See note 2
	104	Disk1-NULL-Disk2	Disk Read/Write Speed	C104	-C102+C103-C101	1.6384	10.15	0.16	1.29	See note 1
DSP Tests	105	Mem-DSP-Mem	DSP Speed	C105-C101	None	1.6384	61.57	0.03	0.21	
	106	Disk1-DSP-Mem	DSP Speed	C106-C102	-C105+C102	1.6384	84.17	0.02	0.16	See note 3
	107	Mem-DSP-Disk2	DSP Speed	C107-C103	-C105+C103	1.6384	69.36	0.02	0.19	
	108	Disk1-DSP-Disk2	DSP Speed	C108-C104	-C105+C104	1.6384	94.30	0.02	0.14	See note 3
VIS Controls	109	Mem-NULL-Mem	Memory Speed	C109	-C101	1.6384	2.60	0.63	5.04	
	110	Disk1-NULL-Mem	Disk Read Speed	C110	-C102	1.6384	4.45	0.37	2.95	
	111	Mem-NULL-Display	Display Write Speed	C111	None	1.6384	6.54	0.25	2.00	
	112	Disk1-NULL-Display	Display Write Speed	C112	-C111+C102	1.6384	10.54	0.16	1.24	
VIS Tests	113	Mem-VIS-Mem	VIS Speed	C113-C109	None	1.6384	5.41	0.30	2.42	
	114	Disk1-VIS-Mem	VIS Speed	C114-C110	-C113+C102	1.6384	8.93	0.18	1.47	
	115	Mem-VIS-Display	VIS-Display Speed	C115-C101	None	1.6384	7.77	0.21	1.69	Trials 1 and 2 not used, see note 4
	116	Disk1-VIS-Display	VIS-Display Speed	C116-C102	-C115+102	1.6384	10.13	0.16	1.29	Trials 1 and 2 not used, see note 4
DSP-VIS Control	117	Mem-NULL-Sckt-NULL-Mem	Memory-Memory Speed	C117	None	1.6384	6.46	0.25	2.03	
	118	Disk1-NULL-Sckt-NULL-Mem	Disk-Memory Speed	C118	C117+102	1.6384	11.60	0.14	1.13	
	119	Mem-NULL-Sckt-NULL-Display	Memory-Display Speed	C119	-C117	1.6384	8.36	0.20	1.57	
	120	Disk1-NULL-Sckt-NULL-Display	Disk-Display Speed	C120	-C118	1.6384	17.20	0.10	0.76	
DSP-VIS Tests	121	Mem-DSP-Sckt-VIS-Mem	DSP-VIS Speed	C121-C117	-C117+C105	1.6384	89.69	0.02	0.15	See note 3
	122	Disk1-DSP-Sckt-VIS-Mem	DSP-VIS Speed	C122-C118	-C121	1.6384	109.80	0.01	0.12	See note 3
	123	Mem-DSP-Sckt-VIS-Display	DSP-VIS Speed	C123-C119	-C121	1.6384	109.33	0.01	0.12	See note 3
	124	Disk-DSP-Sckt-VIS-Display	DSP-VIS Speed	C124-C120	-C121	1.6384	126.76	0.01	0.10	See note 3
			Averaged Memory Speed	5.91 (MBPS)						
			Averaged Disk Read Speed	3.50 (MBPS)						
			Averaged Disk Write Speed	1.53 (MBPS)						
			Averaged DSP Speed	0.18 (MBPS)						
			Averaged VIS Speed	3.59 (MBPS)						

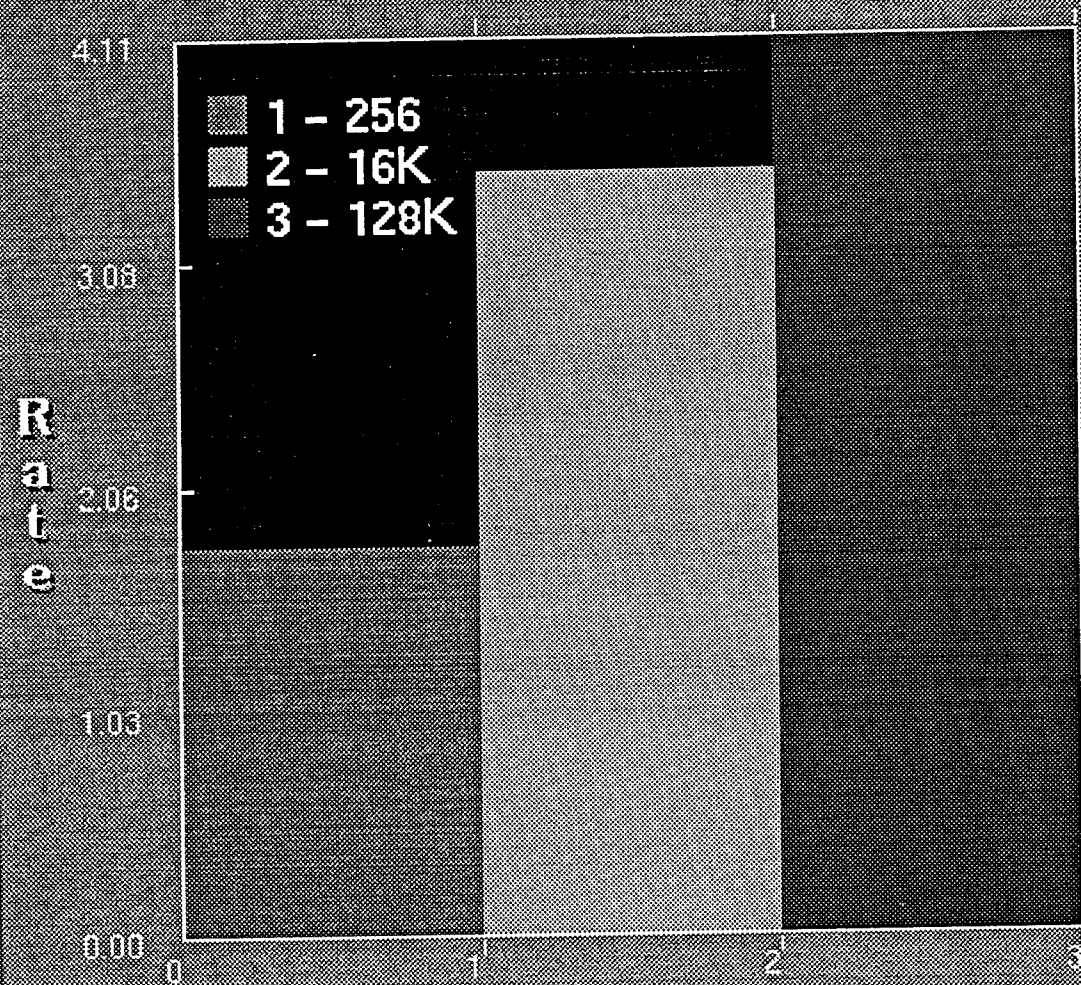
TEST CLASS	CASE #	TEST CASE	PARAMETER MEASURED	DERIVED	PREDICT	ACTUAL MSAMPS	AVG. TIME	AVG. MSPS	AVG. MBPS	EXPLAIN
DSP Controls	101	Mem-NULL-Mem	Memory Speed	C101	None	1.6384	1.75	0.94	7.50	
	102	Disk1-NULL-Mem	Disk Read Speed	C102	None	1.6384	3.19	0.51	4.11	See note 1, note 2
	103	Mem-NULL-Disk2	Disk Write Speed	C103	-C102	1.6384	8.26	0.20	1.59	See note 2
	104	Disk1-NULL-Disk2	Disk Read/Write Speed	C104	-C102+C103-C101	1.6384	10.88	0.15	1.20	See note 1
DSP Tests	105	Mem-DSP-Mem	DSP Speed	C105-C101	None	1.6384	67.84	0.02	0.19	
	106	Disk1-DSP-Mem	DSP Speed	C106-C102	-C105+C102	1.6384	87.89	0.02	0.15	See note 3
	107	Mem-DSP-Disk2	DSP Speed	C107-C103	-C105+C103	1.6384	78.89	0.02	0.17	
	108	Disk1-DSP-Disk2	DSP Speed	C108-C104	-C105+C104	1.6384	98.25	0.02	0.13	See note 3
VIS Controls	109	Mem-NULL-Mem	Memory Speed	C109	-C101	1.6384	2.10	0.78	6.24	
	110	Disk1-NULL-Mem	Disk Read Speed	C110	-C102	1.6384	3.53	0.46	3.72	
	111	Mem-NULL-Display	Display Write Speed	C111	None	1.6384	4.14	0.40	3.17	
	112	Disk1-NULL-Display	Display Write Speed	C112	-C111+C102	1.6384	7.50	0.22	1.75	
VIS Tests	113	Mem-VIS-Mem	DISP Write Speed	C113-C109	None	1.6384	4.67	0.35	2.81	
	114	Disk1-VIS-Mem	VIS Speed	C114-C110	-C113+C102	1.6384	7.21	0.23	1.82	
	115	Mem-VIS-Display	VIS-Display Speed	C115-C101	None	1.6384	4.89	0.33	2.68	
	116	Disk1-VIS-Display	VIS-Display Speed	C116-C102	-C115+C102	1.6384	8.15	0.20	1.61	
DSP-VIS Control	117	Mem-NULL-Sckt-NULL-Mem	Memory-Memory Speed	C117	None	1.6384	14.17	0.12	0.93	
	118	Disk1-NULL-Sckt-NULL-Mem	Disk-Memory Speed	C118	-C117+C102	1.6384	16.54	0.10	0.79	
	119	Mem-NULL-Sckt-NULL-Display	Memory-Display Speed	C119	-C117	1.6384	20.84	0.08	0.63	
	120	Disk1-NULL-Sckt-NULL-Display	Disk-Display Speed	C120	-C118	1.6384	22.16	0.07	0.59	
DSP-VIS Tests	121	Mem-DSP-Sckt-VIS-Mem	DSP-VIS Speed	C121-C117	-C117+C105	1.6384	90.60	0.02	0.14	See note 3
	122	Disk1-DSP-Sckt-VIS-Mem	DSP-VIS Speed	C122-C118	-C121	1.6384	104.91	0.02	0.12	See note 3
	123	Mem-DSP-Sckt-VIS-Display	DSP-VIS Speed	C123-C119	-C121	1.6384	91.65	0.02	0.14	See note 3
	124	Disk-DSP-Sckt-VIS-Display	DSP-VIS Speed	C124-C120	-C121	1.6384	108.38	0.02	0.12	See note 3
			Averaged Memory Speed		7.50 (MBPS)					
			Averaged Disk Read Speed		4.11 (MBPS)					
			Averaged Disk Write Speed		1.59 (MBPS)					
			Averaged DSP Speed		0.17 (MBPS)					
			Averaged VIS Speed		4.19 (MBPS)					

## Sun Memory Rates



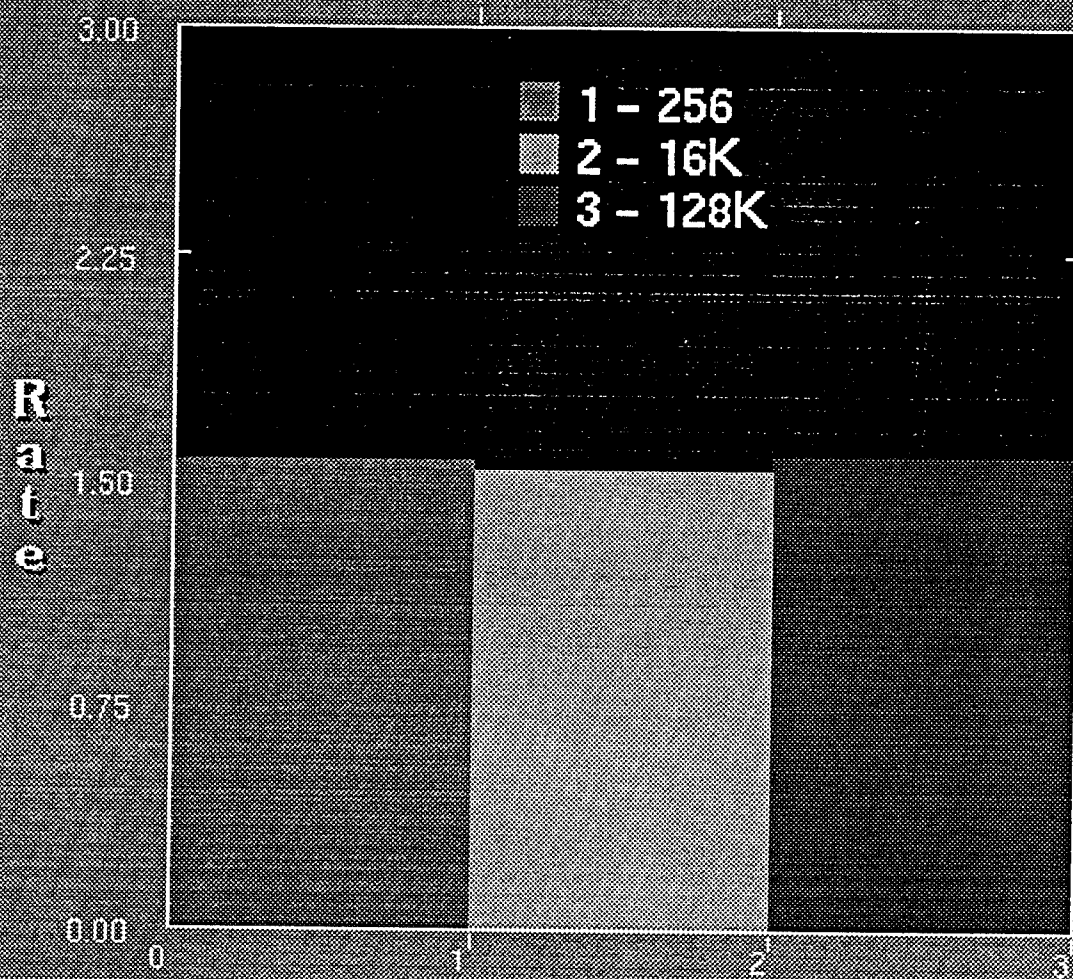
Rates are in Mbytes/Second

## Sun Disk Read Rates



Rates are in Mbytes/Second

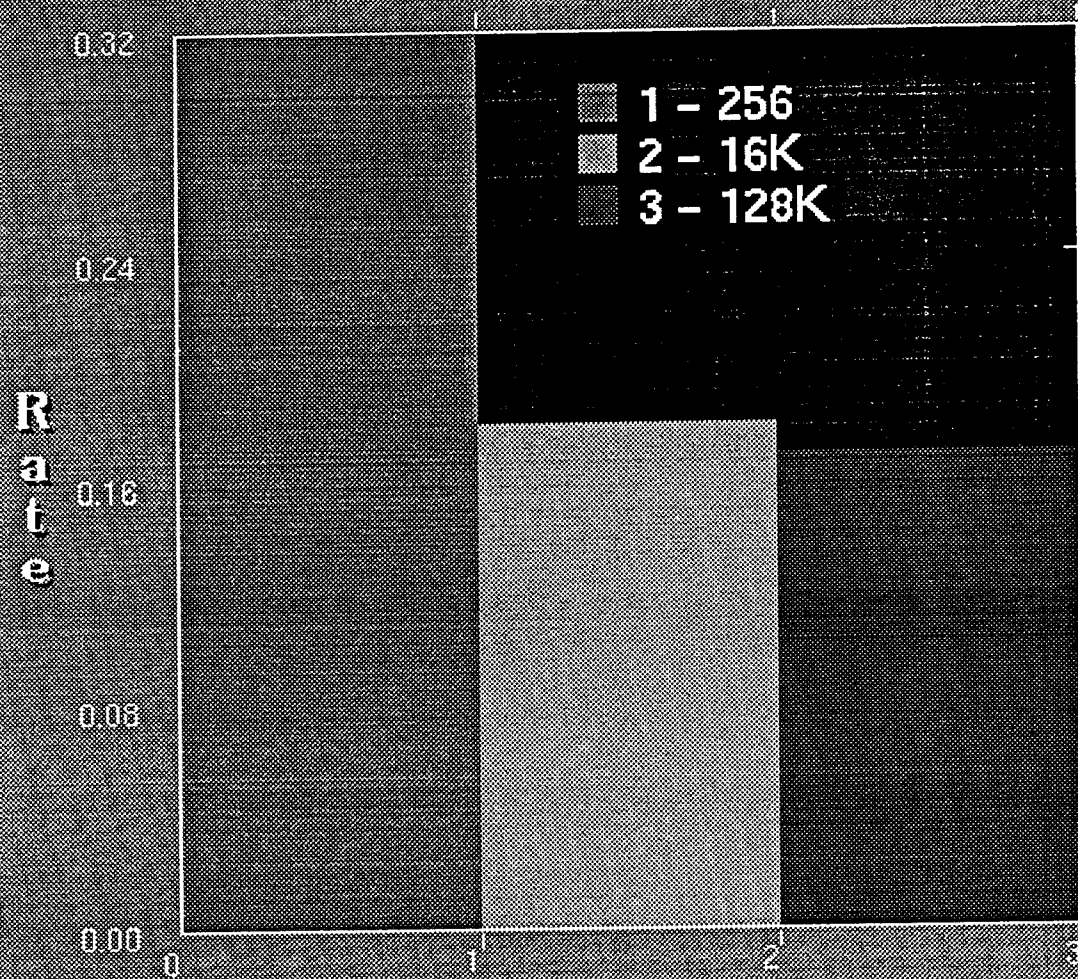
## Sun Disk Write Rates



Rates are in Mbytes/Second

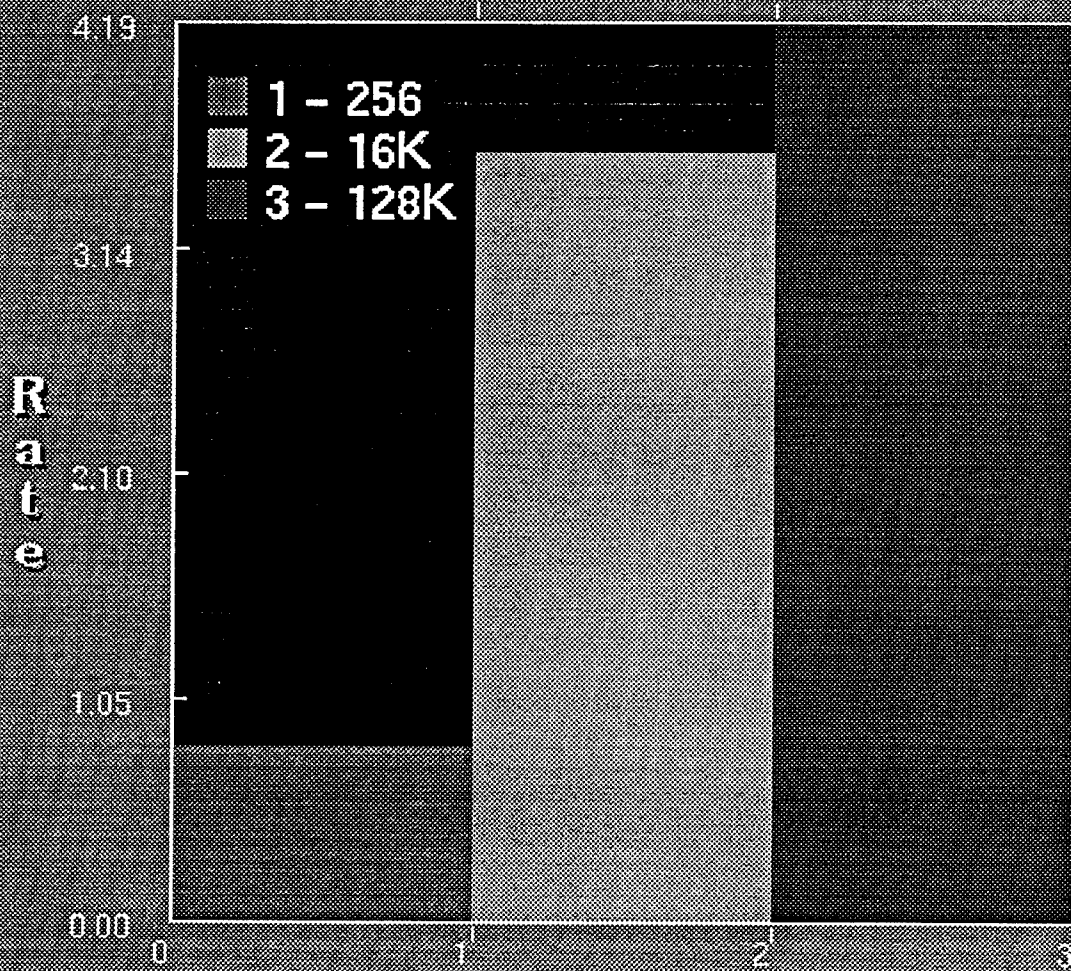


## Sun DSP Rates



Rates are in Mbytes/Second

## Sun VLS Rates



Rates are in Mbytes/Second

### 3.1.2 Cray Standalone Results/Analysis

The points listed below may be referred to when examining the Cray standalone test results spreadsheets which follow. The printed report for each test run that went into the spreadsheet summary can be found in Appendix A. These printed reports contain expanded information about each test, including elapsed time, CPU time, amount of data processed and overall throughput rate for each test. A spreadsheet is presented for each buffer size tested.

#### Notes:

- (1) There were occasionally wide variations in elapsed times for the same tests, even when run without contention. If the maximum trial time was twice as large as the minimum time seen for the same test then the maximum time was not considered in the final average. That is, we discarded these occasional fluctuations so that they did not bias the final results.
- (2) Disk caching resulting in faster read times was observed if the input file had already been by a previous test. We allowed this caching because there was no efficient way to prevent it ( e.g . rebooting the system between test runs which was not a feasible alternative). This explains why the disk read test was significantly faster than the disk write test. For a disk read rate on an initial file read refer to Appendix B or the disk read rates listed in section 3.1.
- (3) Small buffer sizes have a detrimental effect when using asynchronous I/O. Because there is not enough work to keep the CPU busy while I/O is taking place, the task ends up continually waiting for the I/O to finish. The task pays a penalty for the increased overhead of tracking when the I/O has completed.
- (4) Because the Cray AVS package was not available during testing, there are no visual test results for the Cray (cases 209 through 224).
- (5) The computed DSP average for the 256 buffer size was calculated only using the memory tests (i.e. Total\_mbytes/(case 205 time - case 201 time)) because the disk times for the small buffer tests were so unpredictable, possibly due to disk contention (input and output files on the same disk), disk fragmentation, and asynchronous I/O penalties (see Note 3).

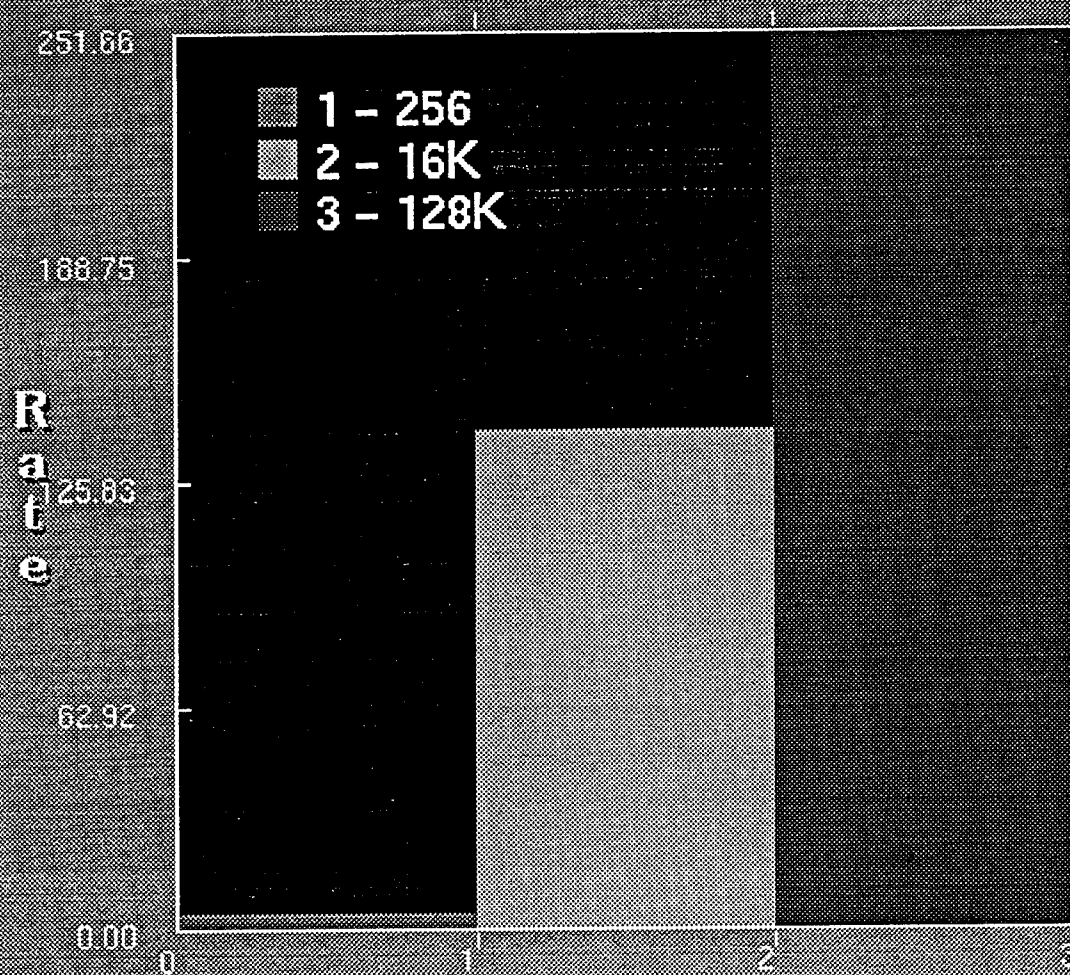


TEST CLASS	CASE #	TEST CASE	PARAMETER MEASURED	DERIVED	PREDICT	ACTUAL MSAMPS	AVG. TIME	AVG. MSPS	AVG. MBPS	EXPLAIN
DSP Controls	201	Mem-NULL-Mem	Memory Speed	C201	None	1.6384	3.087	0.531	4.246	
	202	Disk1-NULL-Mem	Disk Read Speed	C202	None	1.6384	13.247	0.124	0.989	See note 3.
	203	Mem-NULL-Disk2	Disk Write Speed	C203	-C202	1.6384	33.040	0.050	0.397	See note 3.
	204	Disk1-NULL-Disk2	Disk Read/Write Speed	C204	-C202	1.6384	38.027	0.043	0.345	See note 3.
DSP Tests	205	Mem-DSP-Mem	DSP Speed	C205-C201	None	1.6384	12.263	0.134	1.069	
	206	Disk1-DSP-Mem	DSP Speed	C206-C202	-C205	1.6384	17.400	0.094	0.753	See note 3.
	207	Mem-DSP-Disk2	DSP Speed	C207-C203	-C205	1.6384	27.707	0.059	0.473	See note 3.
	208	Disk1-DSP-Disk2	DSP Speed	C208-C204	-C205	1.6384	26.155	0.063	0.501	See notes 1, 3.
VIS Controls	209	Mem-NULL-Mem	Memory Speed	C209	-C201					
	210	Disk1-NULL-Mem	Disk Read Speed	C210	-C202					
	211	Mem-NULL-Display	Display Write Speed	C211	None					
	212	Disk1-NULL-Display	Display Write Speed	C212	-C211					
VIS Tests	213	Mem-VIS-Mem	VIS Speed	C213-C209	None					
	214	Disk1-VIS-Mem	VIS Speed	C214-C210	-C213					
	215	Mem-VIS-Display	VIS Display Speed	C215-C201	None					
	216	Disk1-VIS-Display	VIS Display Speed	C216-C202	-C215					
DSP-VIS Control	217	Mem-NULL-Sckt-NULL-Mem	Memory-Memory Speed	C217	None					
	218	Disk1-NULL-Sckt-NULL-Mem	Disk-Memory Speed	C218	MAX(C202,217)					
	219	Mem-NULL-Sckt-NULL-Display	Memory-Display Speed	C219	-C217					
	220	Disk1-NULL-Sckt-NULL-Display	Disk-Display Speed	C220	-C218					
DSP-VIS Tests	221	Mem-DSP-Sckt-VIS-Mem	DSP-VIS Speed	C221-C217	-C217-C205					
	222	Disk1-DSP-Sckt-VIS-Mem	DSP-VIS Speed	C222-C218	-C221					
	223	Mem-DSP-Sckt-VIS-Display	DSP-VIS Speed	C223-C219	-C221					
	224	Disk-DSP-Sckt-VIS-Display	DSP-VIS Speed	C224-C220	-C221					
			Averaged Memory Speed	4.25 (MBPS)						
			Averaged Disk Read Speed	0.99 (MBPS)						See note 3.
			Averaged Disk Write Speed	0.40 (MBPS)						See note 3.
			Averaged DSP Speed	1.43 (MBPS)						See note 5.
			Averaged VIS Speed	Unavailable						See note 4.

TEST CLASS	CASE #	TEST CASE	PARAMETER MEASURED	DERIVED	PREDICT	ACTUAL MSAMPS	AVG TIME	AVG MSPS	AVG MBPS	EXPLAIN
DSP Controls	201	Mem-NULL-Mem	Memory Speed	C201	None	1.6384	0.093	17.554	140.434	
	202	Disk1-NULL-Mem	Disk Read Speed	C202	None	1.6384	0.283	5.783	46.261	See note 2.
	203	Mem-NULL-Disk2	Disk Write Speed	C203	-C202	1.6384	1.535	1.067	8.539	See note 2.
	204	Disk1-NULL-Disk2	Disk Read/Write Speed	C204	-C202	1.6384	0.640	2.560	20.480	See note 2.
DSP Tests	205	Mem-DSP-Mem	DSP Speed	C205-C201	None	1.6384	3.547	0.462	3.696	See notes 1, 2.
	206	Disk1-DSP-Mem	DSP Speed	C206-C202	-C205	1.6384	3.980	0.412	3.293	
	207	Mem-DSP-Disk2	DSP Speed	C207-C203	-C205	1.6384	5.073	0.323	2.584	
	208	Disk1-DSP-Disk2	DSP Speed	C208-C204	-C205	1.6384	4.510	0.363	2.906	
VIS Controls	209	Mem-NULL-Mem	Memory Speed	C209	-C201					
	210	Disk1-NULL-Mem	Disk Read Speed	C210	-C202					
	211	Mem-NULL-Display	Display Write Speed	C211	None					
	212	Disk1-NULL-Display	Display Write Speed	C212	-C211					
VIS Tests	213	Mem-VIS-Mem	VIS Speed	C213-C209	None					
	214	Disk1-VIS-Mem	VIS Speed	C214-C210	-C213					
	215	Mem-VIS-Display	VIS-Display Speed	C215-C201	None					
	216	Disk1-VIS-Display	VIS-Display Speed	C216-C202	-C215					
DSP-VIS Control	217	Mem-NULL-Sckt-NULL-Mem	Memory-Memory Speed	C217	None					
	218	Disk1-NULL-Sckt-NULL-Mem	Disk-Memory Speed	C218	MAX(C202,C217)					
	219	Mem-NULL-Sckt-NULL-Display	Memory-Display Speed	C219	-C217					
	220	Disk1-NULL-Sckt-NULL-Display	Disk-Display Speed	C220	-C218					
DSP-VIS Tests	221	Mem-DSP-Sckt-VIS-Mem	DSP-VIS Speed	C221-C217	-C217+C205					
	222	Disk1-DSP-Sckt-VIS-Mem	DSP-VIS Speed	C222-C218	-C221					
	223	Mem-DSP-Sckt-VIS-Display	DSP-VIS Speed	C223-C219	-C221					
	224	Disk-DSP-Sckt-VIS-Display	DSP-VIS Speed	C224-C220	-C221					
			Averaged Memory Speed	140.43 (MBPS)						
			Averaged Disk Read Speed	46.26 (MBPS)						See note 2.
			Averaged Disk Write Speed	8.54 (MBPS)						See note 2.
			Averaged DSP Speed	3.60 (MBPS)						
			Averaged VIS Speed	Unavailable						See note 4.

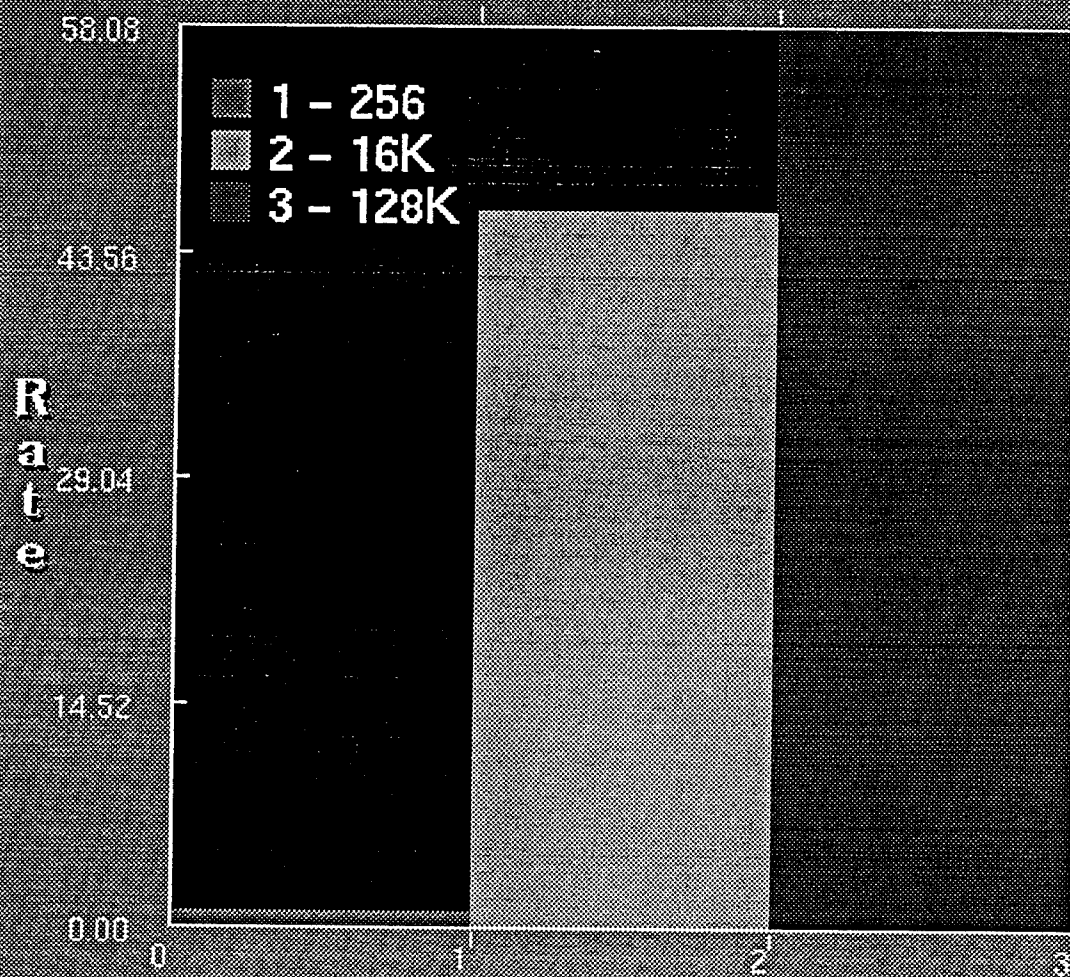
TEST CLASS	CASE #	TEST CASE	PARAMETER MEASURED	DERIVED	PREDICT	ACTUAL MSAMPS	AVG. TIME	AVG. MSPS	AVG. MBPS	EXPLAIN
DSP Controls	201	Mem-NULL-Mem	Memory Speed	C201	None	1.5729	0.050	31.458	251.664	
	202	Disk1-NULL-Mem	Disk Read Speed	C202	None	1.5729	0.217	7.260	58.076	See note 2.
	203	Mem-NULL-Disk2	Disk Write Speed	C203	-C202	1.5729	1.227	1.282	10.258	See note 2.
	204	Disk1-NULL-Disk2	Disk Read/Write Speed	C204	-C202	1.5729	0.413	3.805	30.443	See note 2.
DSP Tests	205	Mem-DSP-Mem	DSP Speed	C205-C201	None	1.5729	3.143	0.500	4.003	
	206	Disk1-DSP-Mem	DSP Speed	C206-C202	-C205	1.5729	3.297	0.477	3.817	
	207	Mem-DSP-Disk2	DSP Speed	C207-C203	-C205	1.5729	4.610	0.341	2.730	Trial 1 not used. See note 1.
	208	Disk1-DSP-Disk2	DSP Speed	C208-C204	-C205	1.5729	3.530	0.446	3.565	Trial 1 not used. See note 1.
VIS Controls	209	Mem-NULL-Mem	Memory Speed	C209	-C201					
	210	Disk1-NULL-Mem	Disk Read Speed	C210	-C202					
	211	Mem-NULL-Display	Display Write Speed	C211	None					
	212	Disk1-NULL-Display	Display Write Speed	C212	-C211					
VIS Tests	213	Mem-VIS-Mem	VIS Speed	C213-C209	None					
	214	Disk1-VIS-Mem	VIS Speed	C214-C210	-C213					
	215	Mem-VIS-Display	VIS-Display Speed	C215-C201	None					
	216	Disk1-VIS-Display	VIS-Display Speed	C216-C202	-C215					
DSP-VIS Control	217	Mem-NULL-Sckt-NULL-Mem	Memory-Memory Speed	C217	None					
	218	Disk1-NULL-Sckt-NULL-Mem	Disk-Memory Speed	C218	MAX(C202,217)					
	219	Mem-NULL-Sckt-NULL-Display	Memory-Display Speed	C219	-C217					
	220	Disk1-NULL-Sckt-NULL-Display	Disk-Display Speed	C220	-C218					
DSP-VIS Tests	221	Mem-DSP-Sckt-VIS-Mem	DSP-VIS Speed	C221-C217	-C217+C205					
	222	Disk1-DSP-Sckt-VIS-Mem	DSP-VIS Speed	C222-C218	-C221					
	223	Mem-DSP-Sckt-VIS-Display	DSP-VIS Speed	C223-C219	-C221					
	224	Disk-DSP-Sckt-VIS-Display	DSP-VIS Speed	C224-C220	-C221					
			Averaged Memory Speed	251.66 (MBPS)						
			Averaged Disk Read Speed	58.08 (MBPS)						See note 2.
			Averaged Disk Write Speed	10.26 (MBPS)						See note 2.
			Averaged DSP Speed	3.97 (MBPS)						
			Averaged VIS Speed	Unavailable						See note 4

## Cray Memory Rates



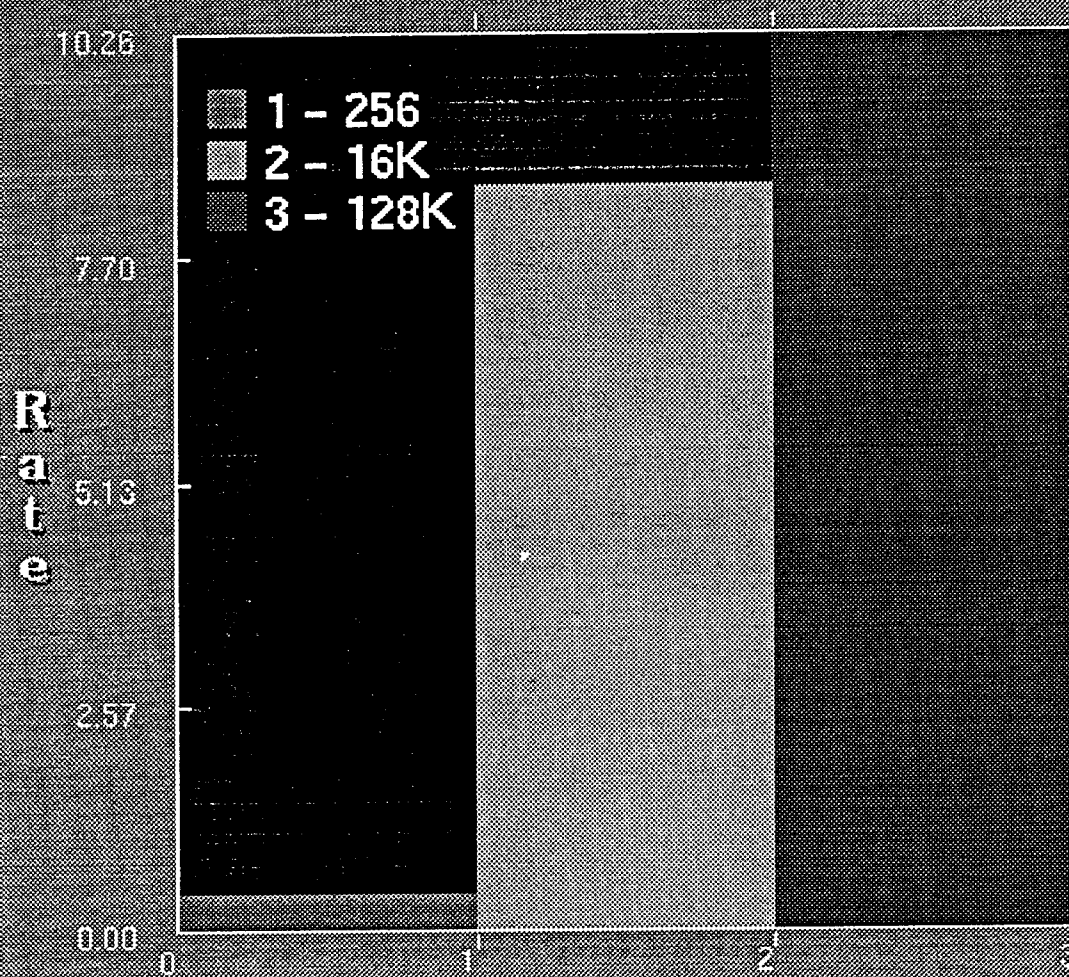
Rates are in Mbytes/Second

## Cray Disk Read Rates



Rates are in Mbytes/Second

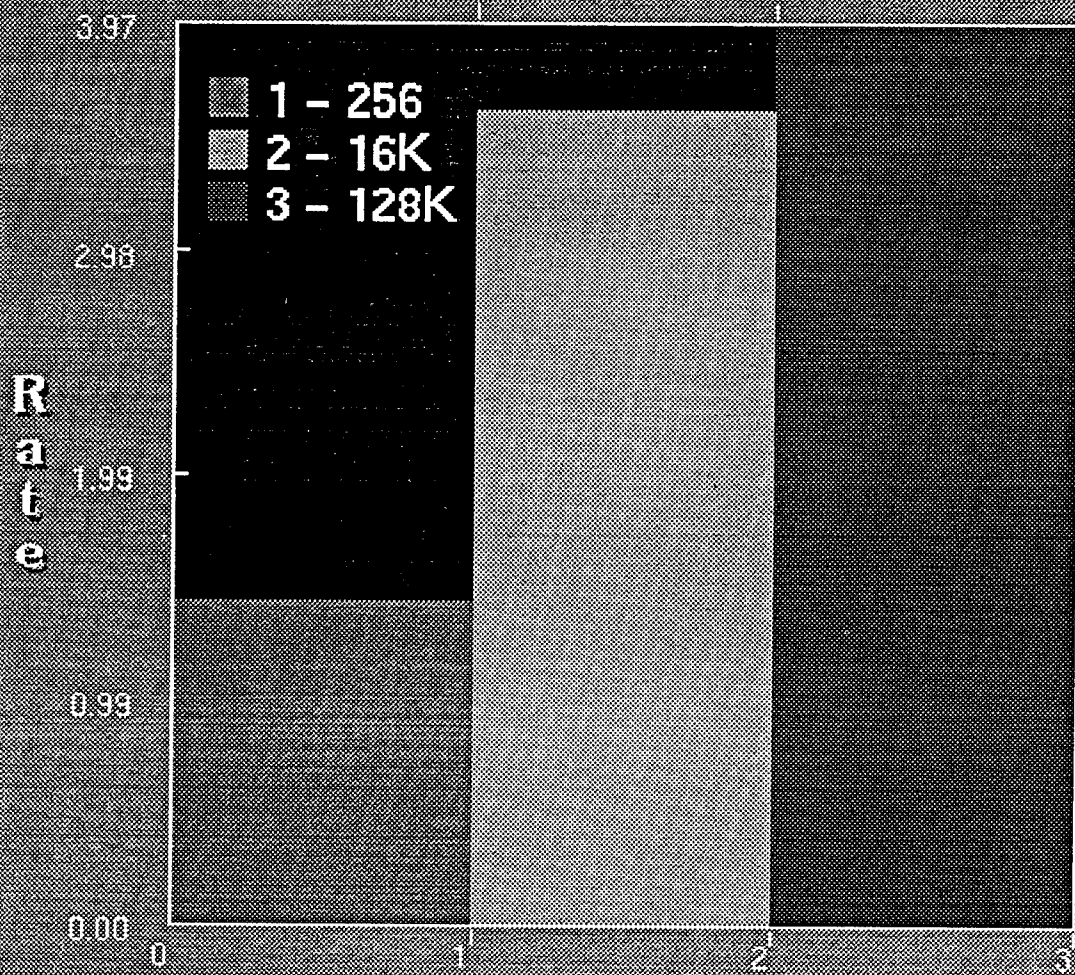
## Cray Disk Write Rates



Rates are in Mbytes/Second



## Cray DSP Rates



Rates are in Mbytes/Second

### 3.1.3 Convex Standalone Results/Analysis

The points listed below may be referred to when examining the Convex standalone test results spreadsheets which follow. The printed report for each test run that went into the spreadsheet summary can be found in Appendix A. These printed reports contain expanded information about each test, including elapsed time, CPU time, amount of data processed and overall throughput rate for each test. A spreadsheet is presented for each buffer size tested.

#### Notes:

- (1) There were occasionally wide variations in elapsed times for the same tests, even when run without contention. If the maximum test time was twice as large as the minimum time seen for the same test then the maximum time was not considered in the final average. That is, we discarded these occasional fluctuations so that they did not bias the final results.
- (2) Test cases 309-316 use synchronous I/O because this code was shared with the Sun test cases.
- (3) The prediction for case 318 is only valid if case 317 and case 318 both transfer the same amount of data.
- (4) The prediction for case 321 is only valid if case 321 and case 317 both transfer the same amount of data.
- (5) Disk caching resulting in faster read times was observed if the input file had already been by a previous test. We allowed this caching because there was no efficient way to prevent it. This explains why the disk read test was significantly faster than the disk write test for the 256 buffer size. For larger buffer sizes, the efficiency of the asynchronous I/O process and the fact that the timings were on the order of 1 second or less mask the effect of disk read caching. For a disk read rate on an initial file read refer to Appendix B or the disk read rates listed in section 3.1.
- (6) Overhead from AVS and the use of synchronous I/O for cases 309-316 skew the results for case 310. The predicted value for this case is not valid.
- (7) Small buffer sizes have a detrimental effect when using asynchronous I/O. Because there is not enough work to keep the CPU busy while I/O is taking place, the task ends up



continually waiting for the I/O to finish. The task pays a penalty for the increased overhead of tracking when the I/O has completed.

- (8) AVS does not handle the small buffer cases well on any platform. These cases produce the most frequent image processing and display updates and correspondingly, generate the most AVS overhead.
- (9) The highest rate of failure for our testing occurred for the AVS standalone tests on the Convex for the 256 buffer size. Certain tests would not run for the appropriate number of iterations.
- (10) Timings for the final four cases, 321-324, were sometimes much greater than the sum of their "standalone" parts. Resource contention (for CPUs, bus bandwidth, etc.) and, subsequently, frequent context switching occurred when both the DSP processing and the VIS processing were done on the same machine.

TEST CLASS	CASE #	TEST CASE	PARAMETER MEASURED	DERIVED	PREDICT	ACTUAL MSAMPS	AVG. TIME	AVG. MSPS	AVG. MBPS	EXPLAIN
DSP Controls	301	Mem-NULL-Mem	Memory Speed	C301	None	1.6384	0.78	2.11	16.88	
	302	Disk1-NULL-Mem	Disk Read Speed	C302	None	1.6384	7.31	0.22	1.79	See note 7.
	303	Mem-NULL-Disk2	Disk Write Speed	C303	None	1.6384	10.86	0.15	1.21	See note 7.
	304	Disk1-NULL-Disk2	Disk Read/Write Speed	C304	-C302	1.6384	14.33	0.11	0.91	See note 7.
DSP Tests	305	Mem-DSP-Mem	DSP Speed	C305-C301	None	1.6384	6.70	0.24	1.96	See note 7.
	306	Disk1-DSP-Mem	DSP Speed	C306-C302	-C305	1.6384	16.76	0.10	0.78	See note 7.
	307	Mem-DSP-Disk2	DSP Speed	C307-C303	-C305	1.6384	16.64	0.10	0.79	See note 7.
	308	Disk1-DSP-Disk2	DSP Speed	C308-C304	-C305	1.6384	22.75	0.07	0.58	See note 7.
VIS Controls	309	Mem-NULL-Mem	Memory Speed	C309	-C301	1.6384	298.08	0.01	0.04	See notes 2, 8.
	310	Disk1-NULL-Mem	Disk Read Speed	C310	-C302	1.6384	304.06	0.01	0.04	See notes 2, 6, 8.
	311	Mem-NULL-Display	Display Write Speed	C311	None	1.6384	583.96	0.00	0.02	See note 2, 8.
	312	Disk1-NULL-Display	Display Write Speed	C312	-C311	1.6384	590.86	0.00	0.02	See note 2, 8.
VIS Tests	313	Mem-VIS-Mem	VIS Speed	C313-C309	None	1.6384	865.72	0.00	0.00	0.02 Trials 1, 2 failed, 3 is suspect. See note 9.
	314	Disk1-VIS-Mem	VIS Speed	C314-C310	-C313	1.6384	0.00	0.00	0.00	All failed for this # iterations. See note 9.
	315	Mem-VIS-Display	VIS-Display Speed	C315-C301	None	1.6384	0.00	0.00	0.00	All failed for this # iterations. See note 9.
	316	Disk1-VIS-Display	VIS-Display Speed	C316-C302	-C315	1.6384	0.00	0.00	0.00	All failed for this # iterations. See note 9.
DSP-VIS Control	317	Mem-NULL-Sckt-NULL-Mem	Memory-Memory Speed	C317	None	1.6384	9.52	0.17	1.38	See note 7.
	318	Disk1-NULL-Sckt-NULL-Mem	Disk-Memory Speed	C318	MAX(C302,C317)	1.6384	17.47	0.09	0.75	See notes 3, 7.
	319	Mem-NULL-Sckt-NULL-Display	Memory-Display Speed	C319	-C317	1.6384	9.07	0.18	1.44	See note 7.
	320	Disk1-NULL-Sckt-NULL-Display	Disk-Display Speed	C320	-C317	1.6384	18.91	0.09	0.69	See note 7.
DSP-VIS Tests	321	Mem-DSP-Sckt-VIS-Mem	DSP-VIS Speed	C321-C317	-C317+C305	1.6384	19.42	0.08	0.67	See notes 4, 7, 10.
	322	Disk1-DSP-Sckt-VIS-Mem	DSP-VIS Speed	C322-C318	-C321	1.6384	28.35	0.06	0.46	See notes 7, 10.
	323	Mem-DSP-Sckt-VIS-Display	DSP-VIS Speed	C323-C319	-C321	1.6384	20.19	0.08	0.65	See notes 7, 10.
	324	Disk-DSP-Sckt-VIS-Display	DSP-VIS Speed	C324-C320	-C321	1.6384	26.63	0.06	0.49	Trial 3 failed. See notes 7, 9, 10.
			Averaged Memory Speed							
			Averaged Disk Read Speed		16.88 (MBPS)					
			Averaged Disk Write Speed		1.79 (MBPS)					
			Averaged DSP Speed		1.21 (MBPS)					
			Averaged VIS Speed		1.77 (MBPS)					
					0.10 (MBPS)					

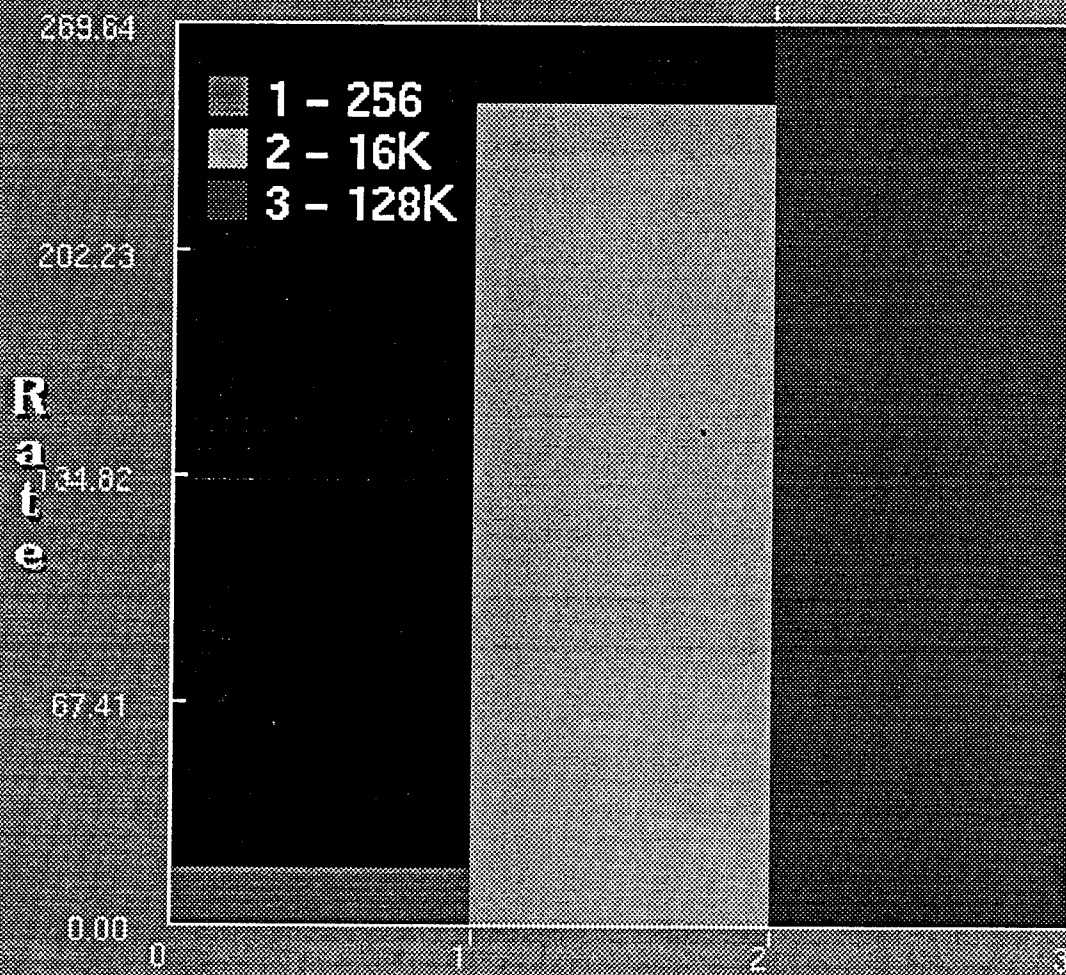
CONVEX\_STANDALONE (Buffsize 16k, CPUs 2)

TEST CLASS	CASE #	TEST CASE	PARAMETER MEASURED	DERIVED	PREDICT	ACTUAL MSAMPS	AVG. TIME	AVG. MSPS	AVG. MBPS	EXPLAIN
DSP Controls	301	Mem-NULL-Mem	Memory Speed	C301	None	1.6384	0.05	30.72	245.76	
	302	Disk1-NULL-Mem	Disk Read Speed	C302	None	1.6384	0.50	3.28	26.21	See note 5.
	303	Mem-NULL-Disk2	Disk Write Speed	C303	-C302	1.6384	0.25	6.55	52.43	Trial 3 not used. See notes 1, 5.
	304	Disk1-NULL-Disk2	Disk Read/Write Speed	C304	-C302	1.6384	0.63	2.59	20.70	
DSP Tests	305	Mem-DSP-Mem	DSP Speed	C305-C301	None	1.6384	2.23	0.73	5.88	Trial 3 not used. See note 1.
	306	Disk1-DSP-Mem	DSP Speed	C306-C302	-C305	1.6384	2.79	0.59	4.70	Trial 3 not used. See note 1.
	307	Mem-DSP-Disk2	DSP Speed	C307-C303	-C305	1.6384	2.81	0.58	4.66	Trial 3 not used. See note 1.
	308	Disk1-DSP-Disk2	DSP Speed	C308-C304	-C305	1.6384	2.91	0.56	4.50	Trial 3 not used. See note 1.
VIS Controls	309	Mem-NULL-Mem	Memory Speed	C309	-C301	1.6384	4.63	0.35	2.83	See note 2.
	310	Disk1-NULL-Mem	Disk Read Speed	C310	-C302	1.6384	4.35	0.38	3.01	See notes 2, 6.
	311	Mem-NULL-Display	Display Write Speed	C311	None	1.6384	8.96	0.18	1.46	See note 2.
	312	Disk1-NULL-Display	Display Write Speed	C312	-C311	1.6384	8.99	0.18	1.46	See note 2.
VIS Tests	313	Mem-VIS-Mem	VIS Speed	C313-C309	None	1.6384	8.17	0.20	1.60	See note 2.
	314	Disk1-VIS-Mem	VIS Speed	C314-C310	-C313	1.6384	7.92	0.21	1.66	See note 2.
	315	Mem-VIS-Display	VIS-Display Speed	C315-C301	None	1.6384	8.23	0.20	1.59	See note 2.
	316	Disk1-VIS-Display	VIS-Display Speed	C316-C302	-C315	1.6384	8.67	0.19	1.51	Trial 1 failed. See note 2.
DSP-VIS Control	317	Mem-NULL-Sckt-NULL-Mem	Memory-Memory Speed	C317	None	1.6384	3.83	0.43	3.42	
	318	Disk1-NULL-Sckt-NULL-Mem	Disk-Memory Speed	C318	MAX(C302,C317)	1.6384	5.70	0.29	2.30	See note 3.
	319	Mem-NULL-Sckt-NULL-Display	Memory-Display Speed	C319	-C317	1.6384	5.79	0.28	2.26	
	320	Disk1-NULL-Sckt-NULL-Display	Disk-Display Speed	C320	-C318	1.6384	8.32	0.20	1.57	
DSP-VIS Tests	321	Mem-DSP-Sckt-VIS-Mem	DSP-VIS Speed	C321-C317	-C317+C305	1.6384	37.78	0.04	0.35	See notes 4, 12.
	322	Disk1-DSP-Sckt-VIS-Mem	DSP-VIS Speed	C322-C318	-C321	1.6384	37.38	0.04	0.35	See note 12.
	323	Mem-DSP-Sckt-VIS-Display	DSP-VIS Speed	C323-C319	-C321	1.6384	42.14	0.04	0.31	See note 12.
	324	Disk1-DSP-Sckt-VIS-Display	DSP-VIS Speed	C324-C320	-C321	1.6384	42.24	0.04	0.31	See note 12.
			Averaged Memory Speed		(MBPS)					
			Averaged Disk Read Speed	245.76	(MBPS)					
			Averaged Disk Write Speed	26.21	(MBPS)					See note 5.
			Averaged DSP Speed	52.43	(MBPS)					See note 5.
			Averaged VIS Speed	5.64	(MBPS)					
				3.69	(MBPS)					

CONVEX\_STANDALONE (Buffsize 128k, CPUs 2)

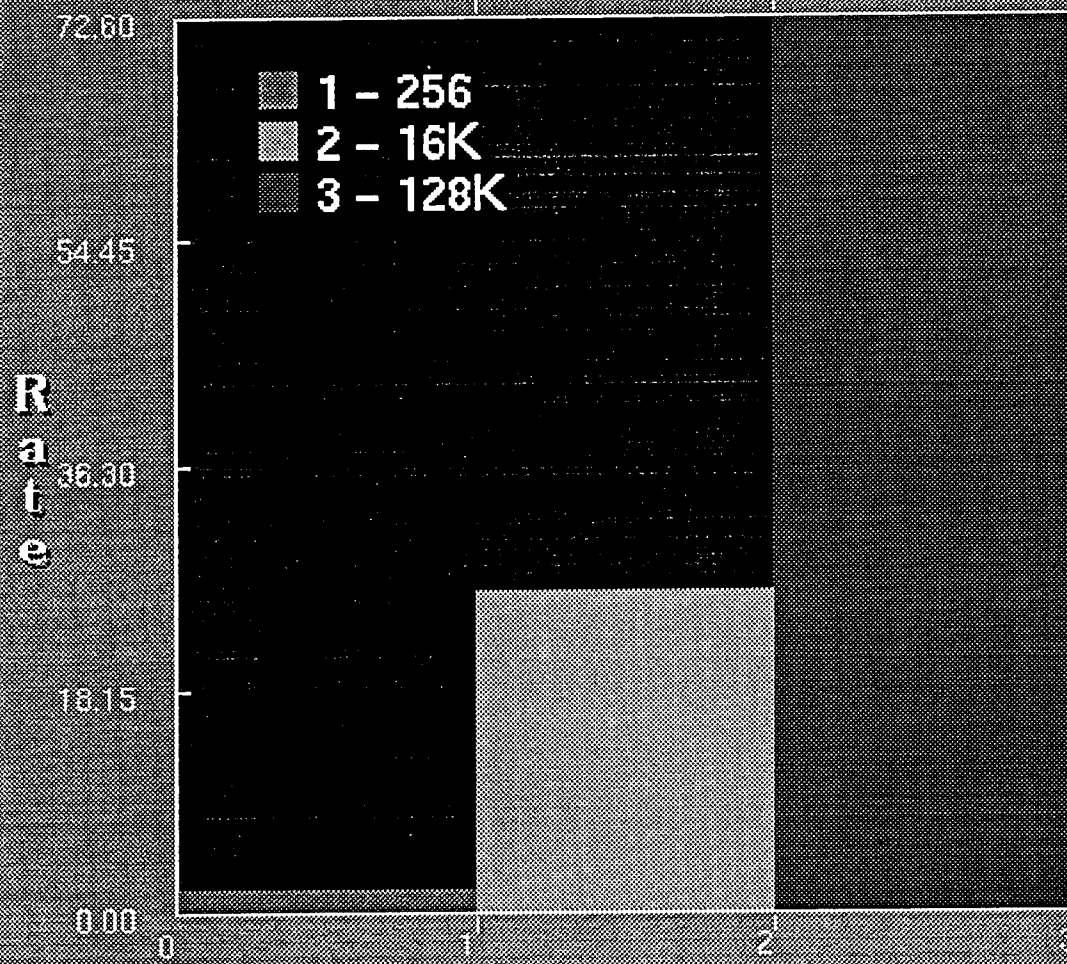
TEST CLASS	CASE #	TEST CASE	PARAMETER MEASURED	DERIVED	PREDICT	ACTUAL MSAMPS	AVG. TIME	AVG. MSPS	AVG. MBPS	EXPLAIN
DSP Controls	301	Mem-NULL-Mem	Memory Speed	C301	None	1.5729	0.05	33.71	269.64	
	302	Disk1-NULL-Mem	Disk Read Speed	C302	None	1.5729	0.17	9.07	72.60	See note 5.
	303	Mem-NULL-Disk2	Disk Write Speed	C303	-C302	1.5729	0.25	6.42	51.36	Trial 1 not used. See notes 1, 5.
	304	Disk1-NULL-Disk2	Disk Read/Write Speed	C304	-C302	1.5729	0.33	4.72	37.75	
DSP Tests	305	Mem-DSP-Mem	DSP Speed	C305-C301	None	1.5729	2.83	0.60	4.78	Trial 2 not used. See note 1.
	306	Disk1-DSP-Mem	DSP Speed	C306-C302	-C305	1.5729	2.74	0.57	4.59	Trial 2 not used. See note 1.
	307	Mem-DSP-Disk2	DSP Speed	C307-C303	-C305	1.5729	3.04	0.52	4.14	Trial 2 not used. See note 1.
	308	Disk1-DSP-Disk2	DSP Speed	C308-C304	-C305	1.5729	4.76	0.33	2.64	Trial 2 not used. See note 1.
VIS Controls	309	Mem-NULL-Mem	Memory Speed	C309	-C301	1.5729	0.96	1.65	13.18	Trial 1 not used. See notes 1, 2.
	310	Disk1-NULL-Mem	Disk Read Speed	C310	-C302	1.5729	0.62	2.54	20.30	Trial 1 not used. See notes 1, 2, 6.
	311	Mem-NULL-Display	Display Write Speed	C311	None	1.5729	3.00	0.53	4.20	Trial 1 not used. See notes 1, 2.
	312	Disk1-NULL-Display	Display Write Speed	C312	-C311	1.5729	3.77	0.42	3.33	See note 2.
VIS Tests	313	Mem-VIS-Mem	VIS Speed	C313-C309	None	1.5729	1.24	1.27	10.15	See note 2.
	314	Disk1-VIS-Mem	VIS Speed	C314-C310	-C313	1.5729	1.24	1.27	10.19	Trial 3 not used. See notes 1, 2.
	315	Mem-VIS-Display	VIS Display Speed	C315-C301	None	1.5729	0.87	1.81	14.46	Trial 3 not used. See notes 1, 2.
	316	Disk1-VIS-Display	VIS Display Speed	C316-C302	-C315	1.5729	0.86	1.83	14.63	Trial 3 not used. See notes 1, 2.
DSP-VIS Control	317	Mem-NULL-Sckt-NULL-Mem	Memory-Memory Speed	C317	None	1.5729	9.56	0.16	1.32	
	318	Disk1-NULL-Sckt-NULL-Mem	Disk-Memory Speed	C318	MAX(C302-C317)	1.5729	7.43	0.21	1.69	Trial 3 failed. See note 3.
	319	Mem-NULL-Sckt-NULL-Display	Memory-Display Speed	C319	-C317	1.5729	13.02	0.12	0.97	
	320	Disk1-NULL-Sckt-NULL-Display	Disk-Display Speed	C320	-C318	1.5729	11.37	0.14	1.11	
DSP-VIS Tests	321	Mem-DSP-Sckt-VIS-Mem	DSP-VIS Speed	C321-C317	-C317-C305	1.5729	15.55	0.10	0.81	See notes 3, 10.
	322	Disk1-DSP-Sckt-VIS-Mem	DSP-VIS Speed	C322-C318	-C321	1.5729	15.65	0.10	0.80	See note 10.
	323	Mem-DSP-Sckt-VIS-Display	DSP-VIS Speed	C323-C319	-C321	1.5729	18.20	0.09	0.69	See note 10.
	324	Disk1-DSP-Sckt-VIS-Display	DSP-VIS Speed	C324-C320	-C321	1.5729	21.74	0.07	0.58	See note 10.
			Averaged Memory Speed		269.64 (MBPS)					See note 5.
			Averaged Disk Read Speed		72.60 (MBPS)					See note 5.
			Averaged Disk Write Speed		51.36 (MBPS)					
			Averaged DSP Speed		4.07 (MBPS)					
			Averaged VIS Speed		27.96 (MBPS)					

## Convex Memory Rates



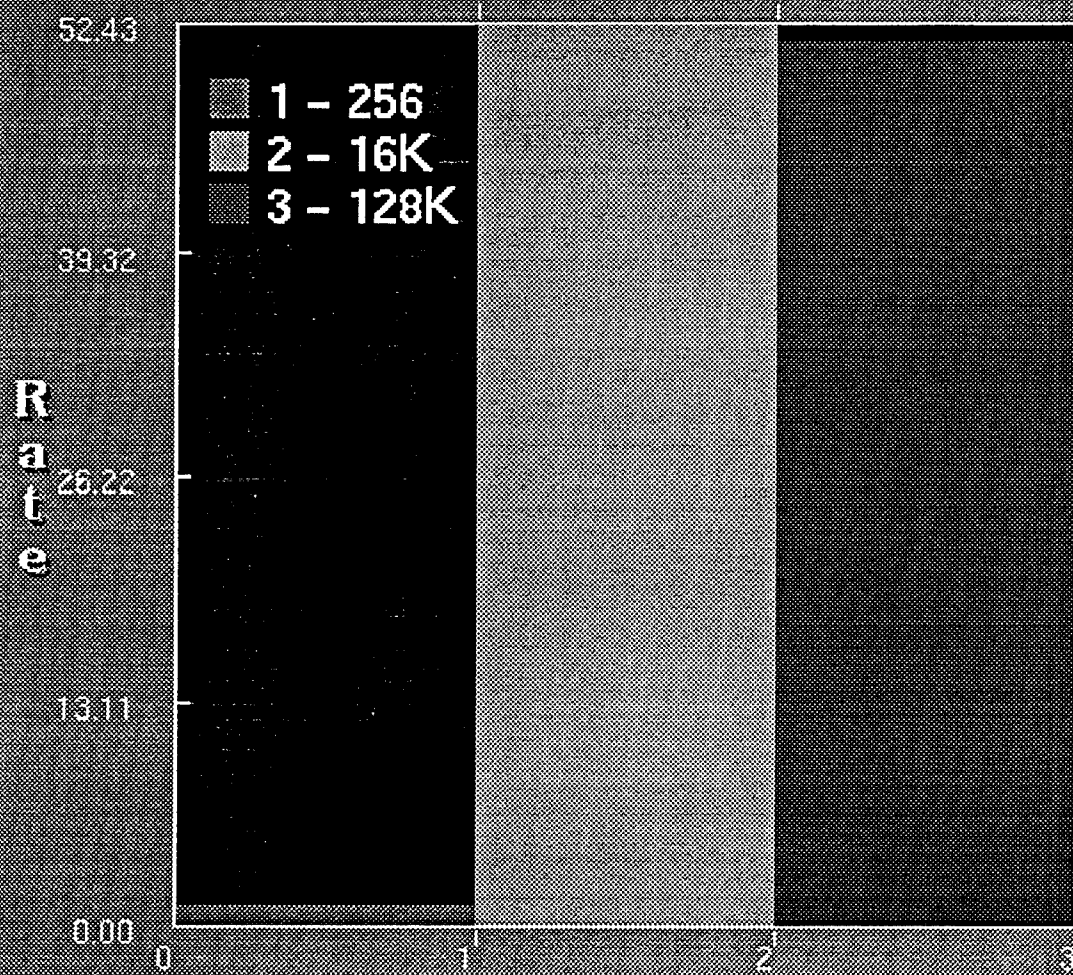
Rates are in Mbytes/Second

## Convex Disk Read Rates



Rates are in Mbytes/Second

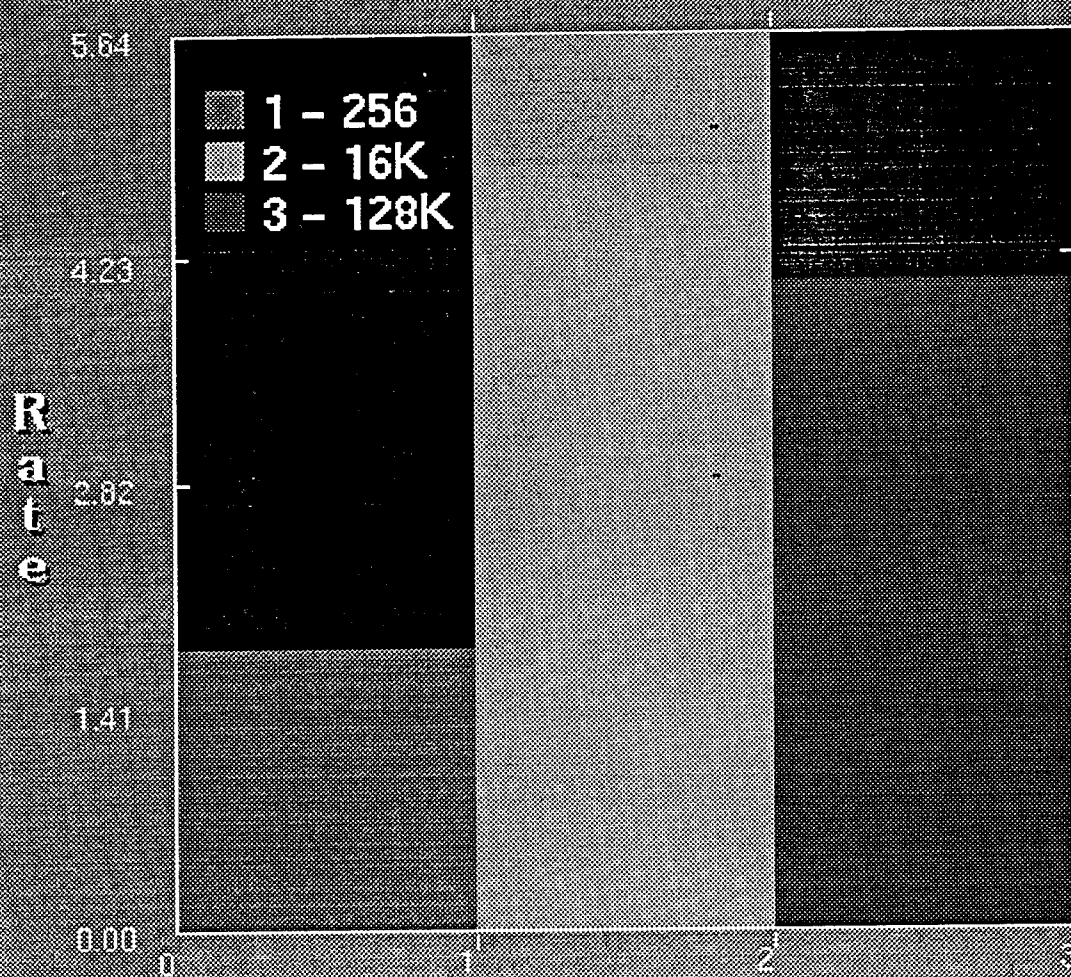
## Convex Disk Write Rates



Rates are in Mbytes/Second



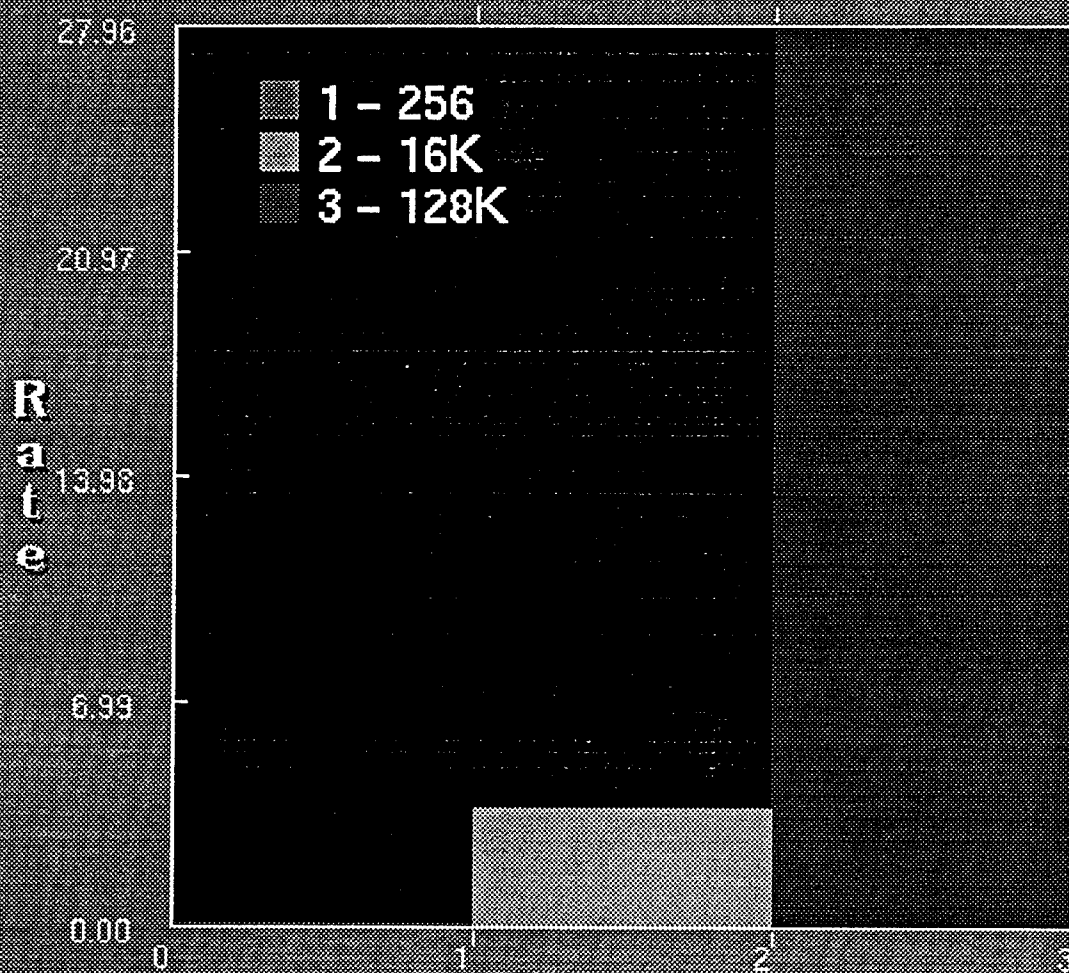
## Convex DSP Rates



Rates are in Mbytes/Second



## Convex VLS Rates



Rates are in Mbytes/Second

### 3.2 Networked Test Results

The following considerations should be noted when examining the networked test results spreadsheets:

- Differences of 10% were allowed in comparing actual results to predicted results due to timing variations from run to run.

- Test cases that failed (due to socket errors) or cases that had abnormally high times (due to contention) were not considered in the average times. Any cases that were excluded are noted in the Explain column of the spreadsheet.

- All Sun-Sun cases were run with synchronous disk I/O.

- Processing times for the Cray and Convex cases are presented for the 2 CPU runs only. On each machine, we used the system's intrinsic FFT in order to maximize throughput. We compiled each routine on the supercomputer at the highest optimization level. On the Cray, we can compile at the highest level and then set an environment variable at runtime to control the number of CPUs used. On the Convex, the FFT function will automatically use as many CPUs as are available when compiling at this optimization level.

- The reports of the test runs that were used for the spreadsheets are listed in Appendix A. These test reports contain the elapsed time and CPU time for each test case. The test reports also contain speeds that were calculated on the basis of individual test results (i.e. they were not averaged using several test cases as the spreadsheets were).

- Sample runs of the networked test cases run in synchronous mode are listed in Appendix B for comparison purposes.

- Averaged speeds (in megabytes per second) presented at the bottom of each spreadsheet were calculated using the following formulas:

Averaged Network Speed = Total\_mbytes / (case 1 time)

Averaged DSP-VIS Speed = Total\_mbytes /

AVERAGE((case 5 time - case 1 time),  
(case 6 time - case 2 time))

- The network speed reported on the spreadsheets reflects asynchronous processing rates. These rates do not reflect the time required to transfer all buffers. Our asynchronous processing only transferred data to the workstation when it was ready to receive data. A more accurate rate for sustained data transfer using the tested threads can be seen by examining the synchronous test results listed in Appendix B. We also wrote a simple client/server model to test socket connections and test network throughput with very little overhead. Using these client/server models we saw the following network throughput rates (in megabytes per second, using a 16K buffer). FDDI rates were slightly slower when a smaller buffer size was used, Ethernet rates remained about the same:

Internal socket to socket transfer (on the same machine).....	2.11 (MBPS)
Ethernet socket to socket transfer.....	1.08 (MBPS)
FDDI socket to socket transfer.....	2.53 (MBPS)

### 3.2.1 Sun-Sun Network Results/Analysis

The points listed below may be referred to when examining the Sun networked test results spreadsheets which follow. The printed report for each test run that went into the spreadsheet summary can be found in Appendix A. These printed reports contain expanded information about each test, including elapsed time, CPU time, amount of data processed and overall throughput rate for each test. A spreadsheet is presented for each buffer size tested.

#### Notes:

- (1) When comparing the networked test cases to the standalone cases that are using small buffers we expect the networked cases to be faster. This is because the machine that is handling the DSP portion of the test (which drives the timing) is not burdened with any visual processing. The smaller the buffer size, the more visual processing that must be done, therefore the networked cases enjoy their greatest advantage at the smallest buffer size. However at a large buffer size this advantage is offset because there is less visual processing being done (fewer updates) and the internal socket transfer in the standalone cases may actually be faster than going over a network.
- (2) Synchronous I/O was used for all disk I/O in the Sun networked test cases (refer to note 1 of the Sun standalone analysis for a full explanation). This accounts for the cases with disk I/O taking longer than the memory cases.
- (3) Because of TCP overhead we did not see much improvement, if any, in network speed using FDDI vs. Ethernet for small buffer sizes. Also keep in mind that asynchronous processing was used here, so any advantage in the FDDI transfer rate may have been offset by more buffers of data being sent than in the Ethernet case. A true comparison of FDDI vs. Ethernet rates can be seen by referring to the synchronous test examples listed in Appendix B, or by the client/server rates reported in section 3.2.
- (4) Test 401, buffer size 16K-FDDI, time 1 was not used in the final average because test failed with a socket error.

TEST CLASS	CASE #	TEST CASE	PARAMETER MEASURED	DERIVED	PREDICT	ACTUAL MSAMPS	AVG TIME	AVG MSPS	AVG. MBPS	EXPLAIN
DSP-VIS Control	401	Mem-NULL-Net-NULL-Mem	Network Speed	C401	~C117	1.6384	6.26	0.26	2.09	See note 1
	402	Disk1-NULL-Net-NULL-Mem	Disk Network Speed	C402	~C118	1.6384	10.76	0.15	1.22	See note 1, note 2
	403	Mem-NULL-Net-NULL-Display	Network-Display Speed	C403	~C401	1.6384	4.87	0.34	2.69	
	404	Disk1-NULL-Net-NULL-Display	Disk Network-Display Speed	C404	~C402	1.6384	7.63	0.21	1.72	
DSP-VIS Tests	405	Mem-DSP-Net-VIS-Mem	DSP-VIS Speed	C405-C401	~C121	1.6384	53.99	0.03	0.24	See note 1
	406	Disk1-DSP-Net-VIS-Mem	DSP-VIS Speed	C406-C402	~C122	1.6384	60.11	0.03	0.22	See note 1, note 2
	407	Mem-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C407-C401	None	1.6384	53.32	0.03	0.25	
	408	Disk1-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C408-C402	~C407	1.6384	60.22	0.03	0.22	
			Averaged Network Speed	2.09 (MBPS)						
			Averaged DSP-VIS Speed	0.27 (MBPS)						

SUN\_SUN (Buffsize 256, FDDI)

TEST CLASS	CASE #	TEST CASE	PARAMETER MEASURED	DERIVED	PREDICT	ACTUAL MSAMPS	AVG. TIME	AVG. MSPS	AVG. MBPS	EXPLAIN
DSP-VIS Control	401	Mem-NULL-Net-NULL-Mem	Network Speed	C401	~C117	1.6384	6.52	0.25	2.01	See note 1, note 3
	402	Disk1-NULL-Net-NULL-Mem	Disk-Network Speed	C402	~C118	1.6384	8.96	0.18	1.46	See note 1, note 2
	403	Mem-NULL-Net-NULL-Display	Network-Display Speed	C403	~C401	1.6384	4.83	0.34	2.71	
	404	Disk1-NULL-Net-NULL-Display	Disk-Network-Display Speed	C404	~C402	1.6384	7.37	0.22	1.78	
DSP-VIS Tests	405	Mem-DSP-Net-VIS-Mem	DSP-VIS Speed	C405-C401	~C121	1.6384	54.19	0.03	0.24	See note 1
	406	Disk1-DSP-Net-VIS-Mem	DSP-VIS Speed	C406-C402	~C122	1.6384	60.55	0.03	0.22	See note 1, note 2
	407	Mem-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C407-C401	None	1.6384	53.24	0.03	0.25	
	408	Disk1-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C408-C402	~C407	1.6384	60.33	0.03	0.22	
			Averaged Network Speed	2.01 (MBPS)						
			Averaged DSP-VIS Speed	0.26 (MBPS)						

**SUN\_SUN (Buffsize 16K, Ethernet)**

TEST CLASS	CASE #	TEST CASE	PARAMETER MEASURED	DERIVED	PREDICT	ACTUAL MSAMPS	AVG. TIME	AVG. MSPS	AVG. MBPS	EXPLAIN
DSP-VIS Control	401	Mem-NULL-Net-NULL-Mem	Network Speed	C401	~C117	1.6384	8.77	0.19	1.49	
	402	Disk1-NULL-Net-NULL-Mem	Disk-Network Speed	C402	~C118	1.6384	13.71	0.12	0.96	
	403	Mem-NULL-Net-NULL-Mem	Network-Display Speed	C403	~C401	1.6384	9.55	0.17	1.37	See note 2
	404	Disk1-NULL-Net-NULL-Display	Disk-Network-Display Speed	C404	~C402	1.6384	15.72	0.10	0.83	
DSP-VIS Tests	405	Mem-DSP-Net-VIS-Mem	DSP-VIS Speed	C405-C401	~C121	1.6384	89.67	0.02	0.15	
	406	Disk1-DSP-Net-VIS-Mem	DSP-VIS Speed	C406-C402	~C122	1.6384	94.77	0.02	0.14	
DSP-VIS Tests	407	Mem-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C407-C401	None	1.6384	89.60	0.02	0.15	
	408	Disk1-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C408-C402	~C407	1.6384	94.86	0.02	0.14	
			Averaged Network Speed	1.49 (MBPS)						
			Averaged DSP-VIS Speed	0.16 (MBPS)						

**SUN\_SUN (BufferSize 16K, FDDI)**

TEST CLASS	CASE #	TEST CASE	PARAMETER MEASURED	DERIVED	PREDICT	ACTUAL MSAMPS	AVG. TIME	AVG. MSPS	AVG. MBPS	EXPLAIN
DSP-VIS Control	401	Mem-NUL-Net-NUL-Mem	Network Speed	C401	~C117	1.6384	7.91	0.21	1.66	Trial 2 failed, see note 4 See note 2
	402	Disk1-NUL-Net-NUL-Mem	Disk-Network Speed	C402	~C118	1.6384	8.53	0.19	1.54	
	403	Mem-NUL-Net-NUL-Display	Network-Display Speed	C403	~C401	1.6384	10.25	0.16	1.28	
	404	Disk1-NUL-Net-NUL-Display	Network-Display Speed	C404	~C402	1.6384	11.69	0.14	1.12	
DSP-VIS Tests	405	Mem-DSP-Net-VIS-Mem	DSP-VIS Speed	C405-C401	~C121	1.6384	81.84	0.02	0.16	
	406	Disk1-DSP-Net-VIS-Mem	DSP-VIS Speed	C406-C402	~C122	1.6384	88.30	0.02	0.15	
	407	Mem-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C407-C401	None	1.6384	82.17	0.02	0.16	
	408	Disk1-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C408-C402	~C407	1.6384	88.36	0.02	0.15	
			Averaged Network Speed	1.66 (MBPS)						
			Averaged DSP-VIS Speed	0.17 (MBPS)						



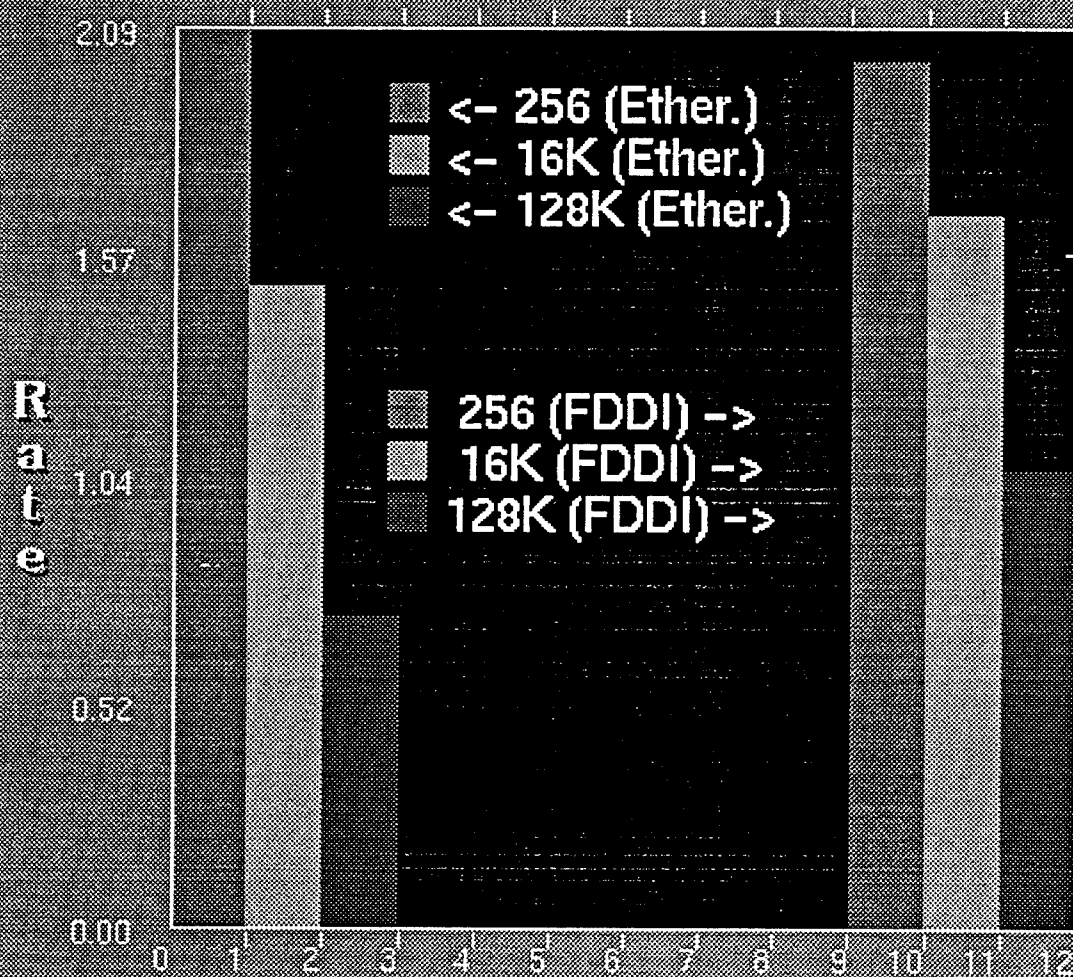
**SUN\_SUN (Buffsize 128K, Ethernet)**

TEST CLASS	CASE #	TEST CASE	PARAMETER MEASURED	DERIVED	PREDICT	ACTUAL MSAMPS	AVG. TIME	AVG. MSPS	AVG. MBPS	EXPLAIN
DSP-VIS Control	401	Mem-NULL-Net-NULL-Mem	Network Speed	C401	~C117	1.5729	17.50	0.09	0.72	
	402	Disk1-NULL-Net-NULL-Mem	Disk-Network Speed	C402	~C118	1.5729	19.01	0.08	0.66	
	403	Mem-NULL-Net-Null-Display	Network-Display Speed	C403	~C401	1.5729	18.72	0.08	0.67	See note 2
	404	Disk1-NULL-Net-NULL-Display	Disk-Network-Display Speed	C404	~C402	1.5729	22.33	0.07	0.56	
DSP-VIS Tests	405	Mem-DSP-Net-VIS-Mem	DSP-VIS Speed	C405-C401	~C121	1.5729	93.79	0.02	0.13	
	406	Disk1-DSP-Net-VIS-Mem	DSP-VIS Speed	C406-C402	~C122	1.5729	98.30	0.02	0.13	
	407	Mem-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C407-C401	None	1.5729	94.62	0.02	0.13	
	408	Disk1-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C408-C402	~C407	1.5729	99.23	0.02	0.13	
			Averaged Network Speed	0.72 (MBPS)						
			Averaged DSP-VIS Speed	0.16 (MBPS)						

**SUN\_SUN (BufferSize 128K, FDDI)**

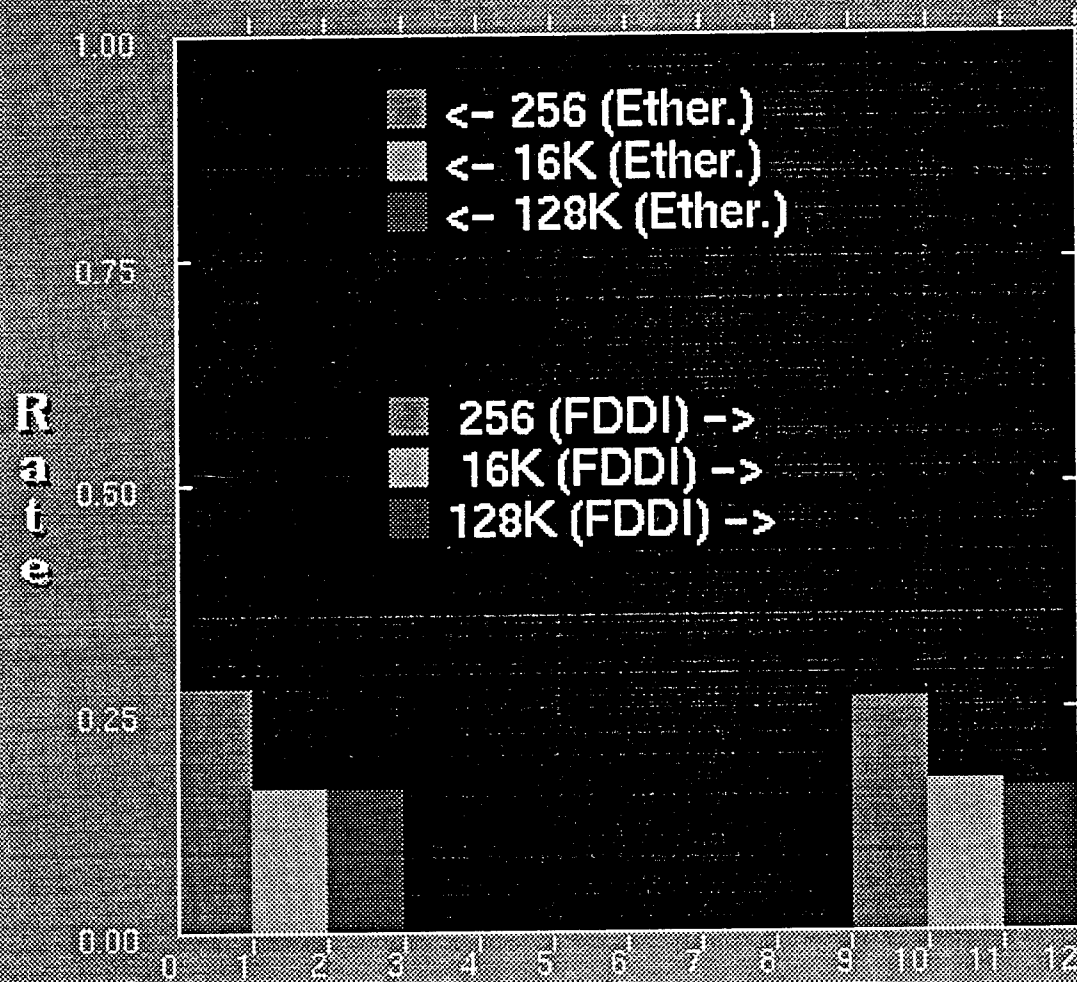
TEST CLASS	CASE #	TEST CASE	PARAMETER MEASURED	DERIVED	PREDICT	ACTUAL MSAMPS	AVG. TIME	AVG. MSPS	AVG. MBPS	EXPLAIN
DSP-VIS Control	401	Mem-NULL-Net-NULL-Mem	Network Speed	C401	~C117	1.5729	11.83	0.13	1.06	
	402	Disk1-NULL-Net-NULL-Mem	Disk-Network Speed	C402	~C118	1.5729	11.99	0.13	1.05	See note 2
	403	Mem-NULL-Net-Null-Display	Network-Display Speed	C403	~C401	1.5729	12.27	0.13	1.03	
	404	Disk1-NULL-Net-NULL-Display	Disk-Network-Display Speed	C404	~C402	1.5729	14.69	0.11	0.86	
DSP-VIS Tests	405	Mem-DSP-Net-VIS-Mem	DSP-VIS Speed	C405-C401	~C121	1.5729	85.86	0.02	0.15	
	406	Disk1-DSP-Net-VIS-Mem	DSP-VIS Speed	C406-C402	~C122	1.5729	93.25	0.02	0.13	
	407	Mem-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C407-C401	None	1.5729	85.89	0.02	0.15	
	408	Disk1-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C408-C402	~C407	1.5729	93.26	0.02	0.13	
			Averaged Network Speed	1.06 (MBPS)						
			Averaged DSP-VIS Speed	0.16 (MBPS)						

## Sun-Sun Async. Network Rates



Rates are in Mbytes/Second

## Sun-Sun Async. DSP-VIS Rates



Rates are in Mbytes/Second

### 3.2.1 Cray-Sun Network Results/Analysis

The points listed below may be referred to when examining the Cray-Sun networked test results spreadsheets which follow. The printed report for each test run that went into the spreadsheet summary can be found in Appendix A. These printed reports contain expanded information about each test, including elapsed time, CPU time, amount of data processed and overall throughput rate for each test. A spreadsheet is presented for each buffer size tested.

#### Notes:

- (1) Because of TCP overhead we did not see much improvement, if any, in network speed using FDDI vs. Ethernet for small buffer sizes. Also keep in mind that asynchronous processing was used here, so any advantage in the FDDI transfer rate may have been offset by more buffers of data being sent than in the Ethernet case. A true comparison of FDDI vs. Ethernet rates can be seen by referring to the synchronous test examples listed in Appendix B, or by the client/server rates reported in section 3.2.
- (2) Small buffer sizes have a detrimental effect when using asynchronous I/O. Because there is not enough work to keep the CPU busy while I/O is taking place, the task ends up continually waiting for the I/O to finish. The task pays a penalty for the increased overhead of tracking when the I/O has completed.
- (3) Because the Cray AVS package was not available during testing, there are no visual test results for the Cray (cases 209 through 224). Thus comparisons with predictions based on these cases could not be made.
- (4) Timings for the final four cases, 505-508, were sometimes much greater than the sum of their "standalone" parts. This increase occurs in both the synchronous and asynchronous versions. In the asynchronous case, we see overhead due to synchronous "handshaking" when sending buffers more than 32768 bytes of data. This data must be transferred using more than one TCP transfer buffer. In the synchronous case, we wait on AVS overhead as well as the network transfer process.
- (5) In cases 501-504 using 16k and 128k as the buffer sizes, our results seem to indicate that we have some intermediate wait time for the asynchronous disk I/O. This effect occurs because the vector memory copy operation can be vectorized and parallelized and the disk read cannot be enhanced in this way. We don't see this behavior in the standalone cases or in the

the synchronous cases but we believe that it occurs in these as well. In the standalone cases, the elapsed times are too small to see these effects. In the synchronous cases, wait time for the data transfer to the AVS process masks the differences.

- (6) In cases 507 and 508, we see slower processing rates than in cases 505 and 506, evidently due to the additional display work being done in the latter cases. Theoretically, when using distributed, asynchronous processing, latency in the display process should not impact the speed of the DSP process. The DSP process should continue processing at its own pace, sending visualization updates only when the workstation process is ready. The additional display processing on the workstation may cause increased overhead due to resource contention. The AVS process may run out of shared memory for interprocess communication or may run out of physical memory space and use virtual memory. Overall AVS processing speed including socket communications processing would decline in either of these cases. The behavior is most evident in the 16K case which performs more visualization process updates than the 128K case. Poor performance by the asynchronous disk I/O masks the effect in the 256 element buffer case.

TEST CLASS	CASE #	TEST CASE	PARAMETER MEASURED	DERIVED	PREDICT	ACTUAL MSAMPS	AVG. TIME	AVG. MSPS	AVG. MBPS	EXPLAIN
DSP-VIS Control	501	Mem-NULL-Net-NULL-Mem	Network Speed	C501	~C217	1.6384	6.12	0.27	2.14	See note 3.
	502	Disk1-NULL-Net-NULL-Mem	Disk Network Speed	C502	~C218	1.6384	11.06	0.15	1.18	See notes 2, 3.
	503	Mem-NULL-Net-NULL-Display	Network-Display Speed	C503	~C501	1.6384	6.30	0.26	2.08	
	504	Disk1-NULL-Net-NULL-Display	Disk Network-Display Speed	C504	~C502	1.6384	10.97	0.15	1.19	See note 2.
DSP-VIS Tests	505	Mem-DSP-Net-VIS-Mem	DSP-VIS Speed	C505-C501	~C221	1.6384	17.66	0.09	0.74	See notes 3, 4.
	506	Disk1-DSP-Net-VIS-Mem	DSP-VIS Speed	C506-C502	~C222	1.6384	22.41	0.07	0.58	See notes 2, 3, 4.
	507	Mem-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C507-C501	None	1.6384	17.18	0.10	0.76	See note 4.
	508	Disk1-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C508-C502	~C507	1.6384	23.02	0.07	0.57	See notes 2, 4.
			Averaged Network Speed	2.14 (MBPS)						
			Averaged DSP-VIS Speed	1.15 (MBPS)						

CRAY\_SUN (Buffsize 256, CPUs 2, FDDI)

TEST CLASS	CASE #	TEST CASE	PARAMETER MEASURED	DERIVED	PREDICT	ACTUAL MSAMPS	AVG. TIME	AVG. MSPS	AVG. MBPS	EXPLAIN
DSP-VIS Control	501	Mem-NULL-Net-NULL-Mem	Network Speed	C501	~C217	1.6384	8.02	0.20	1.63	See note 3.
	502	Disk1-NULL-Net-NULL-Mem	Disk-Network Speed	C502	~C218	1.6384	14.70	0.11	0.89	See notes 2, 3.
	503	Mem-NULL-Net-Null-Display	Network-Display Speed	C503	~C501	1.6384	6.36	0.26	2.06	
	504	Disk1-NULL-Net-NULL-Display	Disk-Network-Display Speed	C504	~C502	1.6384	11.91	0.14	1.10	See note 2.
DSP-VIS Tests	505	Mem-DSP-Net-VIS-Mem	DSP-VIS Speed	C505-C501	~C221	1.6384	17.34	0.09	0.76	See notes 3, 4.
	506	Disk1-DSP-Net-VIS-Mem	DSP-VIS Speed	C506-C502	~C222	1.6384	22.23	0.07	0.59	See notes 2, 3, 4.
	507	Mem-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C507-C501	None	1.6384	17.58	0.09	0.75	See note 4.
	508	Disk1-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C508-C502	~C507	1.6384	22.40	0.07	0.59	See notes 2, 4.
			Averaged Network Speed	1.63 (MBPS)						
			Averaged DSP-VIS Speed	1.56 (MBPS)						



TEST CLASS	CASE #	TEST CASE	PARAMETER MEASURED	DERIVED	PREDICT	ACTUAL MSAMPS	AVG. TIME	AVG. MSPS	AVG. MBPS	EXPLAIN
DSP-VIS Control	501	Mem-NULL-Net-NULL-Mem	Network Speed	C501	-C217	1.6384	3.37	0.49	3.89	See note 3.
	502	Disk1-NULL-Net-NULL-Mem	Disk-Network Speed	C502	-C218	1.6384	4.96	0.33	2.64	See note 3.
	503	Mem-NULL-Net-NULL-Display	Network-Display Speed	C503	-C501	1.6384	4.37	0.37	3.00	
	504	Disk1-NULL-Net-NULL-Display	Disk-Network-Display Speed	C504	-C502	1.6384	5.10	0.32	2.57	
DSP-VIS Tests	505	Mem-DSP-Net-VIS-Mem	DSP-VIS Speed	C505-C501	-C221	1.6384	19.77	0.08	0.66	See notes 1, 3, 4.
	506	Disk1-DSP-Net-VIS-Mem	DSP-VIS Speed	C506-C502	-C222	1.6384	20.25	0.08	0.65	See notes 1, 3, 4.
	507	Mem-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C507-C501	None	1.6384	25.41	0.06	0.52	See notes 1, 4, 6.
	508	Disk1-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C508-C502	-C507	1.6384	26.43	0.06	0.50	See notes 1, 4, 6.
			Averaged Network Speed	3.89 (MBPS)						See note 1.
			Averaged DSP-VIS Speed	0.83 (MBPS)						

CRAY\_SUN (Buffsize 16k, CPUs 2, FDDI)

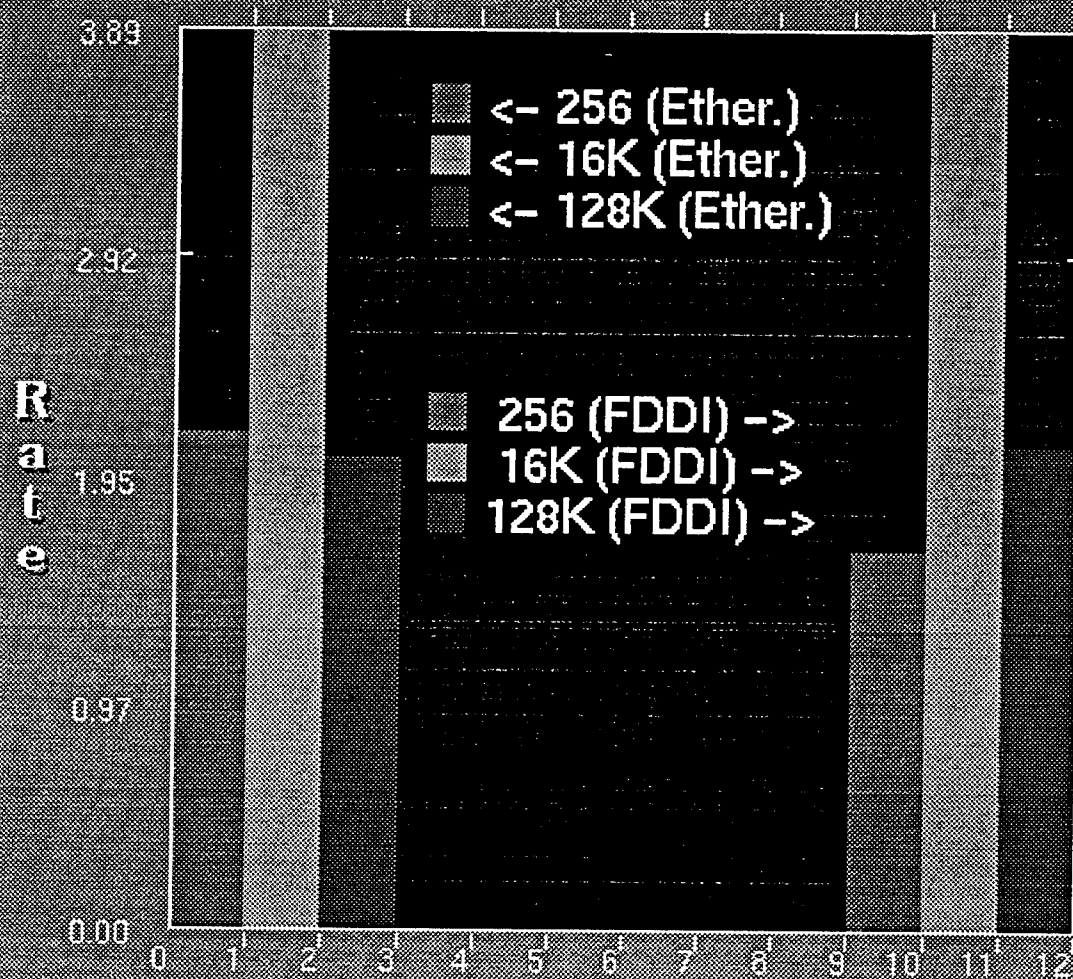
TEST CLASS	CASE #	TEST CASE	PARAMETER MEASURED	DERIVED	PREDICT	ACTUAL MSAMPS	AVG. TIME	AVG. MSPS	AVG. MBPS	EXPLAIN
DSP-VIS Control	501	Mem-NULL-Net-NULL-Mem	Network Speed	C501	~C217	1.6384	3.38	0.49	3.88	See note 3.
	502	Disk1-NULL-Net-NULL-Mem	Disk-NULL-Net-NULL-Mem	C502	~C218	1.6384	3.26	0.50	4.02	See note 3.
	503	Mem-NULL-Net-NULL-Display	Network-Display Speed	C503	~C501	1.6384	3.62	0.45	3.62	
	504	Disk1-NULL-Net-NULL-Display	Disk-NULL-Net-NULL-Display	C504	~C502	1.6384	6.36	0.26	2.06	
DSP-VIS Tests	505	Mem-DSP-Net-VIS-Mem	DSP-VIS Speed	C505-C501	~C221	1.6384	22.53	0.07	0.58	See notes 1, 3, 4.
	506	Disk1-DSP-Net-VIS-Mem	DSP-VIS Speed	C506-C502	~C222	1.6384	22.65	0.07	0.58	See notes 1, 3, 4.
	507	Mem-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C507-C501	None	1.6384	30.96	0.05	0.42	See notes 1, 4, 6.
	508	Disk1-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C508-C502	~C507	1.6384	32.29	0.05	0.41	See notes 1, 4, 6.
			Averaged Network Speed	3.88 (MBPS)						See note 1.
			Averaged DSP-VIS Speed	0.68 (MBPS)						

TEST CLASS	CASE #	TEST CASE	PARAMETER MEASURED	DERIVED	PREDICT	ACTUAL MSAMPS	AVG. TIME	AVG. MSPS	AVG. MBPS	EXPLAIN
DSP-VIS Control	501	Mem-NULL-Net-NULL-Mem	Network Speed	C501	-C217	1.5729	6.16	0.26	2.04	See notes 3, 5.
	502	Disk1-NULL-Net-NULL-Mem	Disk-Network Speed	C502	-C218	1.5729	11.27	0.14	1.12	See notes 3, 5.
	503	Mem-NULL-Net-NULL-Display	Network-Display Speed	C503	-C501	1.5729	8.70	0.18	1.45	See note 5.
	504	Disk1-NULL-Net-NULL-Display	Disk-Network-Display Speed	C504	-C502	1.5729	12.98	0.12	0.97	See note 5.
DSP-VIS Tests	505	Mem-DSP-Net-VIS-Mem	DSP-VIS Speed	C505-C501	-C221	1.5729	25.40	0.06	0.50	See notes 3, 4.
	506	Disk1-DSP-Net-VIS-Mem	DSP-VIS Speed	C506-C502	-C222	1.5729	24.40	0.06	0.52	See notes 3, 4.
	507	Mem-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C507-C501	None	1.5729	26.50	0.06	0.47	See note 4.
	508	Disk1-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C508-C502	-C507	1.5729	26.26	0.06	0.48	See note 4.
			Averaged Network Speed		2.04 (MBPS)					See note 1.
			Averaged DSP-VIS Speed		0.78 (MBPS)					

CRAY\_SUN (Buffsize 128k, CPUs 2, FDDI)

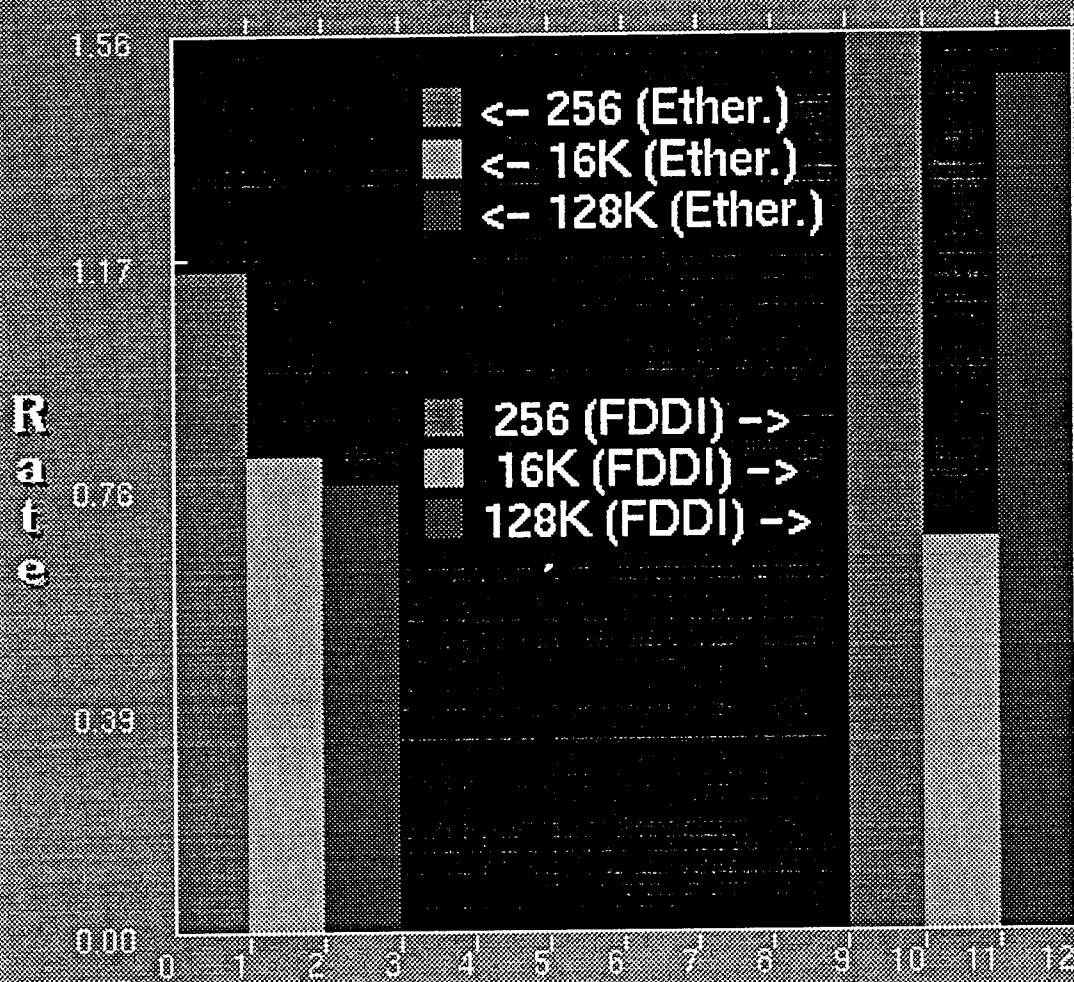
TEST CLASS	CASE #	TEST CASE	PARAMETER MEASURED	DERIVED	PREDICT	ACTUAL MSAMPS	AVG. TIME	AVG. MSPS	AVG. MBPS	EXPLAIN
DSP-VIS Control	501	Mem-NULL-Net-NULL-Mem	Network Speed	C501	~C217	1.5729	6.02	0.26	2.09	See note 3.
	502	Disk1-NULL-Net-NULL-Mem	Disk-Network Speed	C502	~C218	1.5729	6.96	0.23	1.81	See note 3.
	503	Mem-NULL-Net-Null-Display	Network-Display Speed	C503	~C501	1.5729	8.49	0.19	1.48	
	504	Disk1-NULL-Net-NULL-Display	Disk-Network-Display Speed	C504	~C502	1.5729	11.31	0.14	1.11	
DSP-VIS Tests	505	Mem-DSP-Net-VIS-Mem	DSP-VIS Speed	C505-C501	~C221	1.5729	15.29	0.10	0.82	See notes 3, 4.
	506	Disk1-DSP-Net-VIS-Mem	DSP-VIS Speed	C506-C502	~C222	1.5729	14.74	0.11	0.85	See notes 3, 4.
	507	Mem-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C507-C501	None	1.5729	16.22	0.10	0.78	See note 4.
	508	Disk1-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C508-C502	~C507	1.5729	16.35	0.10	0.77	See note 4.
			Averaged Network Speed	2.09 (MBPS)						See note 1.
			Averaged DSP-VIS Speed	1.48 (MBPS)						

## Cray-Sun Async. Network Rates



Rates are in Mbytes/Second

## Cray-Sun Async. DSP-VIS Rates



Rates are in Mbytes/Second

### 3.2.3 Convex-Sun Network Results/Analysis

The points listed below may be referred to when examining the Convex-Sun networked test results spreadsheets which follow. The printed report for each test run that went into the spreadsheet summary can be found in Appendix A. These printed reports contain expanded information about each test, including elapsed time, CPU time, amount of data processed and overall throughput rate for each test. A spreadsheet is presented for each buffer size tested.

#### Notes:

- (1) As with the standalone cases, there were occasionally wide variations in elapsed times for the same tests, even when run without contention. If the maximum trial time was twice as large as the minimum time seen for the same test then the maximum time was not considered in the final average. That is, we discarded these occasional fluctuations so that they did not bias the final results.
- (2) We had only two runs for the Convex-Sun Ethernet cases, rather than three. One of these runs showed unusually high timings due to contention. This run was not used.
- (3) Because of TCP overhead we did not see much improvement, if any, in network speed using FDDI vs. Ethernet for small buffer sizes. Also keep in mind that asynchronous processing was used here, so any advantage in the FDDI transfer rate may have been offset by more buffers of data being sent than in the Ethernet case. A true comparison of FDDI vs. Ethernet rates can be seen by referring to the synchronous test examples listed in Appendix B, or by the client/server rates reported in section 3.2.
- (4) Small buffer sizes have a detrimental effect when using asynchronous I/O. Because there is not enough work to keep the CPU busy while I/O is taking place, the task ends up continually waiting for the I/O to finish. The task pays a penalty for the increased overhead of tracking when the I/O has completed.
- (5) Timings for the final four cases, 605-608, were sometimes much greater than the sum of their "standalone" parts. This increase occurs in both the synchronous and asynchronous versions. In the asynchronous case, we see overhead due to synchronous "handshaking" when sending buffers more than 32768 bytes of data. This data must be transferred using more than one TCP transfer buffer. In the synchronous case, we wait on AVS overhead as well as the network transfer process.

- (6) In cases 601-604 using 16K (FDDI) and 128K as the buffer sizes, our results seem to indicate that we have some intermediate wait time for the asynchronous disk I/O. This effect occurs because the vector memory copy operation can be vectorized and parallelized and the disk read cannot be enhanced in this way. We don't see this behavior in the standalone cases or in the synchronous cases but we believe that it occurs in these as well. In the standalone cases, the elapsed times are too small to see these effects. In the synchronous cases, wait time for the data transfer to the AVS process masks the differences.
- (7) On the 16K case, timings for 605 and 606 are better than predicted. Resource contention and context switching on the Convex slow the standalone cases, 321 and 322 for the higher iteration (256 and 16K buffer sizes) cases.
- (8) On the 128K case, timings for 605 and 606 are worse than predicted. For the 128K standalone case, there are very few visual updates (12 or less) and less context switching
- (9) In cases 607 and 608, we see slower processing rates than in cases 605 and 606, evidently due to the additional display work being done in the latter cases. Theoretically, when using distributed, asynchronous processing, latency in the display process should not impact the speed of the DSP process. The DSP process should continue processing at its own pace, sending visualization updates only when the workstation process is ready. The additional display processing on the workstation may cause increased overhead due to resource contention. The AVS process may run out of shared memory for interprocess communication or may run out of physical memory space and use virtual memory. Overall AVS processing speed including socket communications processing would decline in either of these cases. The behavior is most evident in the 16K case which performs more visualization process updates than the 128K case. Poor performance by the asynchronous disk I/O masks the effect in the 256 element buffer case.



CONVEX\_SUN (Bufileize 256, CPUs 2, Ethernet)

TEST CLASS	CASE #	TEST CASE	PARAMETER MEASURED	DERIVED	PREDICT	ACTUAL MSAMPS	AVG. TIME	AVG. MSPS	AVG. MBPS	EXPLAIN
DSP-VIS Control	601	Mem-NULL-Net-NULL-Mem	Network Speed	C601	-C317	1.6384	8.23	0.20	1.59	Trials 1,3 not used. See note 2.
	602	Disk1-NULL-Net-NULL-Mem	Disk-Network Speed	C602	-C318	1.6384	16.76	0.10	0.78	Trials 1,3 not used. See notes 2, 4.
	603	Mem-NULL-Net-NULL-Display	Network-Display Speed	C603	-C601	1.6384	8.98	0.18	1.46	Trials 1,3 not used. See notes 2, 4.
	604	Disk1-NULL-Net-NULL-Display	Disk-Network-Display Speed	C604	-C602	1.6384	15.24	0.11	0.86	Trials 1,3 not used. See notes 2, 4.
DSP-VIS Tests	605	Mem-DSP-Net-VIS-Mem	DSP-VIS Speed	C605-C601	-C321	1.6384	16.08	0.10	0.82	Trials 1,3 not used. See notes 2, 4.
	606	Disk1-DSP-Net-VIS-Mem	DSP-VIS Speed	C606-C602	-C322	1.6384	23.34	0.07	0.56	Trials 1,3 not used. See notes 2, 4.
	607	Mem-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C607-C601	None	1.6384	16.18	0.10	0.81	Trials 1,3 not used. See notes 2, 4.
	608	Disk1-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C608-C602	-C607	1.6384	23.47	0.07	0.56	Trials 1,3 not used. See notes 2, 4.
			Averaged Network Speed	1.59 (MBPS)						
			Averaged DSP-VIS Speed	1.82 (MBPS)						

CONVEX\_SUN (Buffsize 256, CPUs 2, FDDI)

TEST CLASS	CASE #	TEST CASE	PARAMETER MEASURED	DERIVED	PREDICT	ACTUAL MSAMPS	AVG. TIME	AVG. MSPS	AVG. MBPS	EXPLAIN
DSP-VIS Control	601	Mem-NULL-Net-NULL-Mem	Network Speed	C601	~C317	1.6384	8.72	0.19	1.50	
	602	Disk1-NULL-Net-NULL-Mem	Disk-Network Speed	C602	~C318	1.6384	17.57	0.09	0.75	See notes 3, 4.
	603	Mem-NULL-Net-NULL-Display	Network-Display Speed	C603	~C601	1.6384	7.22	0.23	1.82	See note 4.
	604	Disk1-NULL-Net-NULL-Display	Disk-Network-Display Speed	C604	~C602	1.6384	15.00	0.11	0.87	See note 4.
DSP-VIS Tests	605	Mem-DSP-Net-VIS-Mem	DSP-VIS Speed	C605-C601	~C321	1.6384	14.89	0.11	0.88	See note 4.
	606	Disk1-DSP-Net-VIS-Mem	DSP-VIS Speed	C606-C602	~C322	1.6384	20.78	0.08	0.63	See notes 1, 4.
	607	Mem-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C607-C601	None	1.6384	15.79	0.10	0.83	See note 4.
	608	Disk1-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C608-C602	~C607	1.6384	20.68	0.08	0.63	See notes 1, 4.
			Averaged Network Speed	1.50 (MBPS)						
			Averaged DSP-VIS Speed	2.80 (MBPS)						

TEST CLASS	CASE #	TEST CASE	PARAMETER MEASURED	DERIVED	PREDICT	ACTUAL MSAMPS	AVG. TIME	AVG. MSPS	AVG. MBPS	EXPLAIN
DSP-VIS Control	601	Mem-NULL-Net-NULL-Mem	Network Speed	C601	~C317	1.6384	4.47	0.37	2.93	Trial 3 not used. See note 2.
	602	Disk1-NULL-Net-NULL-Mem	Disk Network Speed	C602	~C318	1.6384	4.97	0.33	2.64	Trial 3 not used. See note 2.
	603	Mem-NULL-Net-NULL-Display	Network-Display Speed	C603	~C601	1.6384	4.26	0.39	3.08	Trial 3 not used. See note 2.
	604	Disk1-NULL-Net-NULL-Display	Disk Network-Display Speed	C604	~C602	1.6384	4.79	0.34	2.74	Trial 3 not used. See note 2.
DSP-VIS Tests	605	Mem-DSP-Net-VIS-Mem	DSP-VIS Speed	C605-C601	~C321	1.6384	14.36	0.11	0.91	Trial 1,3 not used. See notes 2, 7.
	606	Disk1-DSP-Net-VIS-Mem	DSP-VIS Speed	C606-C602	~C322	1.6384	17.18	0.10	0.76	Trial 1,3 not used. See notes 2, 7.
	607	Mem-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C607-C601	None	1.6384	15.09	0.11	0.87	Trial 1,3 not used. See note 2.
	608	Disk1-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C608-C602	~C607	1.6384	22.39	0.07	0.59	Trial 1,3 not used. See notes 2, 9.
			Averaged Network Speed	2.93 (MBPS)						
			Averaged DSP-VIS Speed	1.19 (MBPS)						

CONVEX\_SUN (Buftsize 16K, CPUs 2, FDDI)

TEST CLASS	CASE #	TEST CASE	PARAMETER MEASURED	DERIVED	PREDICT	ACTUAL MSAMPS	AVG. TIME	AVG. MSPS	AVG. MBPS	EXPLAIN
DSP-VIS Control	601	Mem-NULL-Net-NULL-Mem	Network Speed	C601	~C317	1.6384	4.55	0.36	2.88	
	602	Disk1-NULL-Net-NULL-Mem	Disk-Network Speed	C602	~C318	1.6384	6.67	0.25	1.97	See notes 3, 6.
	603	Mem-NULL-Net-NULL-Display	Network-Display Speed	C603	~C601	1.6384	5.93	0.28	2.21	See notes 3, 6.
	604	Disk1-NULL-Net-NULL-Display	Disk-Network-Display Speed	C604	~C602	1.6384	7.34	0.22	1.79	See notes 3, 6.
DSP-VIS Tests	605	Mem-DSP-Net-VIS-Mem	DSP-VIS Speed	C605-C601	~C321	1.6384	24.46	0.07	0.54	See notes 3, 6, 7.
	606	Disk1-DSP-Net-VIS-Mem	DSP-VIS Speed	C606-C602	~C322	1.6384	24.33	0.07	0.54	Trial 1 failed. See notes 3, 7.
	607	Mem-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C607-C601	None	1.6384	34.33	0.05	0.38	See notes 3, 9.
	608	Disk1-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C608-C602	~C607	1.6384	33.59	0.05	0.39	See notes 3, 9.
			Averaged Network Speed	2.88 (MBPS)						
			Averaged DSP-VIS Speed	0.70 (MBPS)						

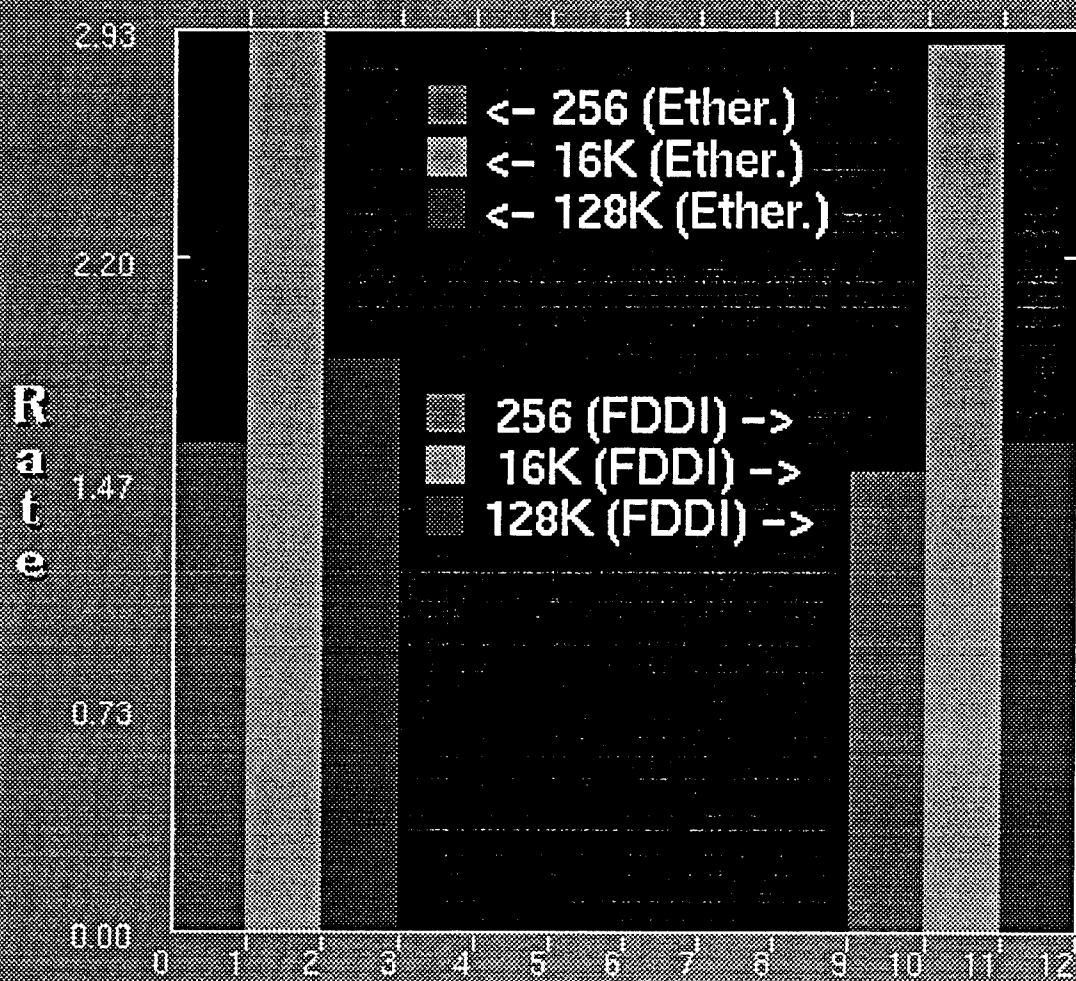
CONVEX\_SUN (Buffsize 128k, CPUs 2, Ethernet)

TEST CLASS	CASE #	TEST CASE	PARAMETER MEASURED	DERIVED	PREDICT	ACTUAL MSAMPS	AVG. TIME	AVG. MSPS	AVG. MBPS	EXPLAIN
DSP-VIS Control	601	Mem-NULL-Net-NULL-Mem2	Network Speed	C601	-C317	1.5729	6.72	0.23	1.87	Trial 3 not used. See note 2.
	602	Disk1-NULL-Net-NULL-Mem	Disk-Network Speed	C602	-C318	1.5729	11.81	0.13	1.07	Trial 3 not used. See note 2.
	603	Mem-NULL-Net-NULL-Display	Network-Display Speed	C603	-C601	1.5729	9.95	0.16	1.26	Trial 3 not used. See notes 2, 6.
	604	Disk1-NULL-Net-NULL-Display	Disk-Network-Display Speed	C604	-C602	1.5729	13.33	0.12	0.94	Trial 3 not used. See notes 2, 6.
DSP-VIS Tests	605	Mem-DSP-Net-VIS-Mem	DSP-VIS Speed	C605-C601	-C321	1.5729	28.85	0.05	0.44	Trial 3 not used. See notes 2, 5, 8.
	606	Disk1-DSP-Net-VIS-Mem	DSP-VIS Speed	C606-C602	-C322	1.5729	29.66	0.05	0.42	Trial 3 not used. See notes 2, 5, 8.
	607	Mem-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C607-C601	None	1.5729	28.94	0.05	0.43	Trial 3 not used. See notes 2, 5, 8.
	608	Disk1-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C608-C602	-C607	1.5729	29.84	0.05	0.42	Trial 3 not used. See notes 2, 5.
			Averaged Network Speed	1.87	(MBPS)					
			Averaged DSP-VIS Speed	0.63	(MBPS)					

CONVEX\_SUN (Buffsize 128k, CPUs 2, FDDI)

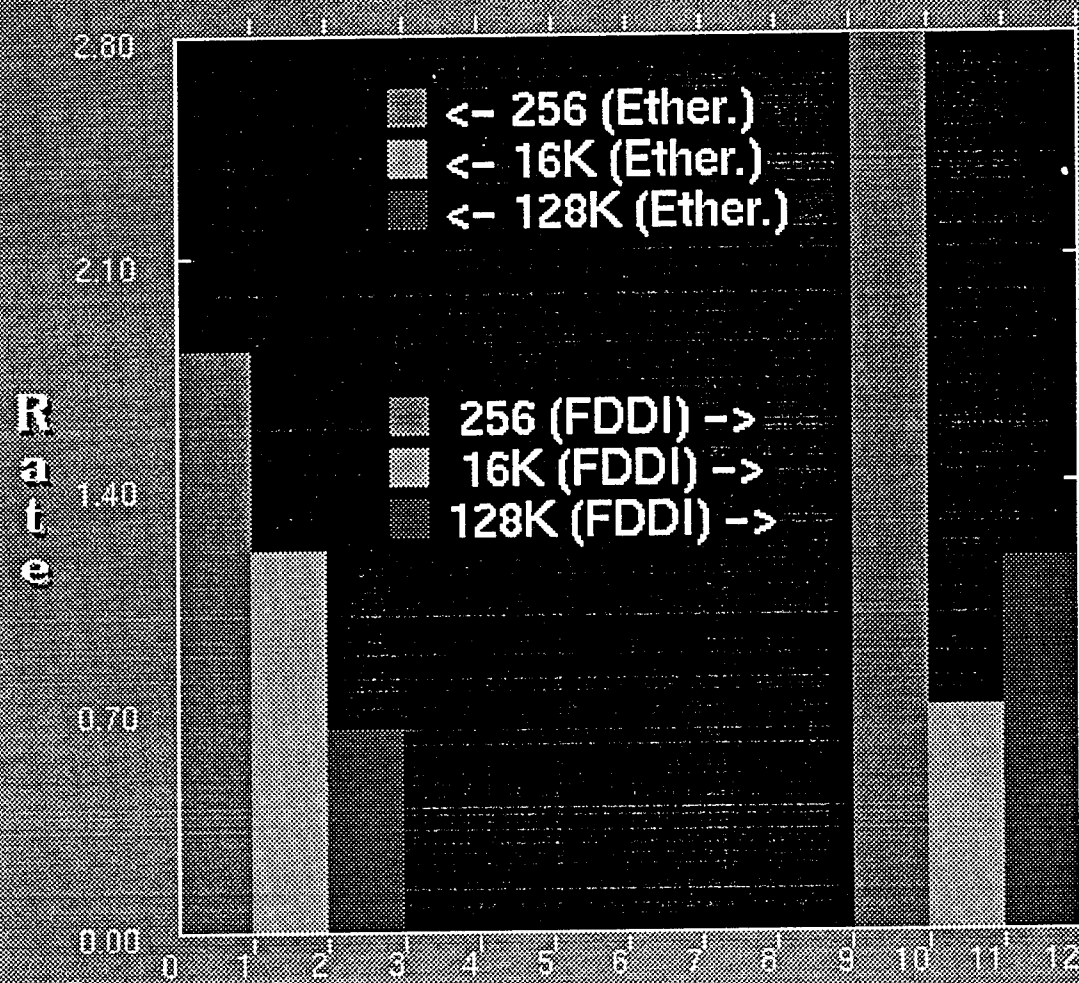
TEST CLASS	CASE #	TEST CASE	PARAMETER MEASURED	DERIVED	PREDICT	ACTUAL MSAMPS	AVG. TIME	AVG. MSPS	AVG. MBPS	EXPLAIN
DSP-VIS Control	601	Mem-NULL-Net-NULL-Mem	Network Speed	C601	~C317	1.5729	7.91	0.20	1.59	See notes 4, 6.
	602	Disk1-NULL-Net-NULL-Mem	Disk-Network Speed	C602	~C318	1.5729	11.96	0.13	1.05	See note 6.
	603	Mem-NULL-Net-Null-Display	Network-Display Speed	C603	~C601	1.5729	10.59	0.15	1.19	See note 6.
	604	Disk1-NULL-Net-NULL-Display	Disk-Network-Display Speed	C604	~C602	1.5729	13.87	0.11	0.91	See note 6.
DSP-VIS Tests	605	Mem-DSP-Net-VIS-Mem	DSP-VIS Speed	C605-C601	~C321	1.5729	21.12	0.07	0.60	See notes 5, 8.
	606	Disk1-DSP-Net-VIS-Mem	DSP-VIS Speed	C606-C602	~C322	1.5729	20.47	0.08	0.61	See notes 5, 8.
	607	Mem-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C607-C601	None	1.5729	18.54	0.08	0.68	See note 5.
	608	Disk1-DSP-Net-VIS-Display	DSP-VIS-Display Speed	C608-C602	~C607	1.5729	19.34	0.08	0.65	Trial 2 not used. See notes 1, 5.
			Averaged Network Speed	1.59 (MBPS)						
			Averaged DSP-VIS Speed	1.16 (MBPS)						

## Convex-Sun Async. Network Rates



Rates are in Mbytes/Second

## Convex-Sun Async. DSP-VIS Rates



Rates are in Mbytes/Second



### 3.3 Summary

The following spreadsheets summarize the test results for each buffer size. Note that some items are not applicable to all tests. For example, Ethernet and FDDI speeds do not apply to standalone tests and disk and memory speeds were not measured by the networked tests. Also note that there are no visual speeds listed for the Cray standalone cases because AVS was not available for the Cray. The following points may be referred to when examining the summary spreadsheets:

#### Notes:

- (1) VIS speeds were measured on the Sun and Convex using synchronous I/O.
- (2) For the DSP-VIS and End-to-End speeds FDDI rates were used for the networked test configurations

SUMMARY\_SHEET (Bufile 256)

TEST CLASS	SUN SOLO (MBPS)	CHAY SOLO (MBPS)	CONVEX SOLO (MBPS)	SUN-SUN (MBPS)	CRAY-SUN (MBPS)	CONVEX SUN (MBPS)	EXPLAIN
Memory Speed	4.22	4.25	16.88	N/A	N/A	N/A	
Disk Read Speed	1.79	0.99	1.79	N/A	N/A	N/A	
Disk Write Speed	1.57	0.40	1.21	N/A	N/A	N/A	
Ethernet Speed	N/A	N/A	N/A	2.09	2.14	1.59	
FDDI Speed	N/A	N/A	N/A	2.01	1.63	1.5	
DSP Speed	0.32	1.43	1.77	N/A	N/A	N/A	
VIS Speed	0.81	Unavailable	0.10	N/A	N/A	N/A	See note 1
DSP-VIS Speed	0.11	Unavailable	1.26	0.26	1.56	2.8	See note 2
End-to-End Speed	0.07	Unavailable	0.49	0.22	0.59	0.63	See note 2

SUMMARY\_SHEET (Buffsize 16K)

TEST CLASS	SUN SOLO (MBPS)	CRAY SOLO (MBPS)	CONVEX SOLO (MBPS)	SUN-SUN (MBPS)	CRAY-SUN (MBPS)	CONVEX SUN (MBPS)	EXPLAIN
Memory Speed	5.91	140.43	245.76	N/A	N/A	N/A	
Disk Read Speed	3.50	46.26	26.21	N/A	N/A	N/A	
Disk Write Speed	1.53	8.54	52.43	N/A	N/A	N/A	
Ethernet Speed	N/A	N/A	N/A	1.49	3.89	2.93	
FDDI Speed	N/A	N/A	N/A	1.66	3.88	2.88	
DSP Speed	0.18	3.60	5.64	N/A	N/A	N/A	
VIS Speed	3.59	Unavailable	3.69	N/A	N/A	N/A	See note 1
DSP-VIS Speed	0.14	Unavailable	0.40	0.17	0.68	0.70	See note 2
End-to-End Speed	0.10	Unavailable	0.31	0.15	0.41	0.39	See note 2

SUMMARY\_SHEET (Buffsize 128K)

TEST CLASS	SUN SOLO (MBPS)	CRAY SOLO (MBPS)	CONVEX SOLO (MBPS)	SUN-SUN (MBPS)	CRAY-SUN (MBPS)	CONVEX SUN (MBPS)	EXPLAIN
Memory Speed	7.50	251.66	269.64	N/A	N/A	N/A	
Disk Read Speed	4.11	58.08	72.60	N/A	N/A	N/A	
Disk Write Speed	1.59	10.26	51.36	N/A	N/A	N/A	
Ethernet Speed	N/A	N/A	N/A	0.72	2.04	1.87	
FDDI Speed	N/A	N/A	N/A	1.06	2.09	1.59	
DSP Speed	0.71	3.97	4.07	N/A	N/A	N/A	
VIS Speed	4.19	Unavailable	27.96	N/A	N/A	N/A	See note 1
DSP-VIS Speed	0.15	Unavailable	1.77	0.16	1.48	1.16	See note 2
End-to-End Speed	0.12	Unavailable	0.58	0.14	0.77	0.65	See note 2

#### 4.0 Conclusions

The main objective of the ASPS Performance Analysis Study is to provide an assessment of the elements of the proposed ASPS architecture designed in the initial ASPS architecture study.

We first analyzed our processing results in terms of buffer size. We saw that memory and disk transfer functions were most efficient for the largest buffer size. Network transfers were more efficient for the two larger buffer sizes than for the small 256 element size buffer. Ethernet rates continued to improve at the 128K level but FDDI rates leveled off at the 16K size. For the standalone DSP tests, processing was most efficient for the Sun and the Cray at the 128K size. For the Convex, DSP processing was most efficient at the 16K size. Standalone VIS processing was most efficient when doing the fewest number of visual updates (i.e. at the largest buffer size). AVS imposes a significant penalty for small buffer processing as this case requires the most iterations of the AVS visualization thread. AVS system executable overhead increases with the number of iterations of the thread. Therefore, as expected, end-to-end processing was most efficient at the highest buffer size.

We also made a number of observations based on comparisons of Ethernet transfer rates and FDDI rates. In separate testing with low overhead, client-server transfer routines, we measured FDDI transfer rates which were 2.5 times as fast as Ethernet rates. In our synchronous processing cases, we observed a similar performance ratio. In asynchronous case testing, the elapsed test times were close for the FDDI cases and the Ethernet cases. However due to the speed of the FDDI connection more actual buffers were transferred resulting in more display updates.

One aspect of the proposed ASPS architecture study concerned the distribution of the graphics processing load between the supercomputer and the workstation. In our standalone processing on the Convex, the entire DSP and graphics processing burden was placed on the supercomputer and the workstation functioned only as a X windows display device. In the networked cases, all visualization processing was done on the Sun. We observed that timings for the standalone cases and the networked cases were very close on the Convex for the 128K buffer size which, of course, requires the fewest display updates. For smaller buffer sizes (which require many more updates), the standalone cases are much slower than the networked cases (both synchronous and asynchronous) due to AVS overhead and the additional processing burden. We conclude that the distributed model of processing, with the DSP process on the Convex and the

graphics processing on the workstation, makes the most efficient use of machine cycles on the Convex.

Of the three platforms tested, of course, the Sun workstation was the slowest for doing the DSP processing. Processing was approximately 20 times slower on the Sun than it was on the Convex or on the Cray. The rate limiting factor in end-to-end processing on the Sun was the DSP process.

Overall performance differences between the Convex and the Cray were minor. For example, sample test runs for the disk-DSP-disk case using 128K buffers and 12 iterations were approximately 3 seconds on the Convex and 3.5 seconds on the Cray. At a sampling frequency of 6.25 MHz, these times translate to processing at a rate of approximately 12 times real-time on the Convex and 14 times real-time on the Cray. For an end-to-end networked case, the times were approximately 17.5 seconds (69 times real-time) on the Convex and 16 seconds (63 times real-time) on the Cray. The clock speed for the Convex 3800 series is 16.67 nanoseconds (ns.). Each has two functional units which can be run in parallel. The peak performance rate for the 3820 is thus 240 MFLOPS in 64 bit arithmetic. For the Cray Y-MP EL, the clock speed is 30 ns. Each CPU has four functional units. If all these units on each CPU could be kept busy, then the peak performance rate for two CPUs would be 266 MFLOPS. In the version 6.0 of the UNICOS operating system, however, the compilers produce code which only takes advantage of chaining between two functional units, yielding a peak performance rate of 133 MFLOPS for two CPUs. This shortcoming is corrected in version 7.0 which is to be released in April of 1993. Calculations based on an estimated operation count of about 157 million floating point calculations (based on a 128K buffer size) for the DSP processing used in our tests indicate we achieved approximately 53 MFLOPS on the Convex and 45 MFLOPS on the Cray. Of course, these estimates are rough as the elapsed time for these cases is only on the order of 3 seconds. A difference of one half-second translates to about an 8 MFLOP change. Additional analysis and tuning could improve these times as well. For the types of applications in which we are interested, achieved performance rates of about one quarter of the peak are realistic.

In conclusion, the processing rates we have observed during these tests indicate that, as expected, software based signal processing on the platforms tested still does not equal real-time hardware rates for these applications. However, software-based processing on appropriate platforms, using appropriately-designed tools, gives the user the flexibility to adapt rapidly to changes in signals, in signal environments, and, these days, in targets and missions. It also allows the user to take advantage of progress in DSP algorithm research and in open systems standards

development to transparently exploit the dynamic price-performance evolution in VLSI technology. Given this exceptional flexibility, lower throughput is an acceptable tradeoff.

**APPENDIX A**

**ASYNCHRONOUS TEST REPORTS**



**A.1****SUN STANDALONE TEST REPORTS**

The following test reports were used in preparing the spreadsheets for the Sun standalone test results. The reports are listed in order of buffer size. These reports are for asynchronous processing. For comparison to synchronous results, refer to Appendix B.

Test Case:	Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun01a	Sun Memory-Memory	2.62	1.58	13.11	5.00	1.64	0.62
sun02a	Sun Disk-Memory	8.93	3.57	13.11	1.47	1.64	0.18
sun03a	Sun Memory-Disk	6.84	5.73	13.11	1.92	1.64	0.24
sun04a	Sun Disk-Disk	10.26	9.48	13.11	1.28	1.64	0.16
sun05a	Sun Mem-DSP-Mem	35.74	33.82	13.11	0.37	1.64	0.05
sun06a	Sun Disk-DSP-Mem	63.52	61.28	13.11	0.21	1.64	0.03
sun07a	Sun Mem-DSP-Disk	43.56	42.48	13.11	0.30	1.64	0.04
sun08a	Sun Disk-DSP-Disk	70.44	67.15	13.11	0.19	1.64	0.02
sun09a	Sun Mem-Null-Mem	20.52	6.35	13.11	0.64	1.64	0.08
sun10a	Sun Disk-NULL-Mem	24.60	8.98	13.11	0.53	1.64	0.07
sun11a	Sun Mem-Null-Display	428.49	6.03	13.11	0.03	1.64	0.00
sun12a	Sun Disk-Null-Display	431.47	10.98	13.11	0.03	1.64	0.00
sun13a	Sun Mem-VIS-Mem	35.99	6.10	13.11	0.36	1.64	0.05
sun14a	Sun Disk-VIS-Mem	38.81	8.35	13.11	0.34	1.64	0.04
sun15a	Sun Mem-VIS-Display	433.57	6.55	13.11	0.03	1.64	0.00
sun16a	Sun Disk-VIS-Display	2858.92	9.90	13.11	0.00	1.64	0.00
sun17a	Sun Memory-Socket-Memory	13.75	3.35	13.11	0.95	1.64	0.12
sun18a	Sun Disk-Socket-Memory	16.28	6.27	13.11	0.81	1.64	0.10
sun19a	Sun Memory-Socket-Display	5.10	2.75	13.11	2.57	1.64	0.32
sun20a	Sun Disk-Socket-Display	10.26	6.20	13.11	1.28	1.64	0.16
sun21a	Sun Mem-DSP-Socket-Vis	103.61	42.06	13.11	0.13	1.64	0.02
sun22a	Sun Disk-DSP-Socket-Vis	152.79	63.60	13.11	0.09	1.64	0.01
sun23a	Sun Mem-DSP-Sck-Vis-Disp	95.66	42.36	13.11	0.14	1.64	0.02
sun24a	Sun Disk-DSP-Sck-Vis-Disp	146.93	64.58	13.11	0.09	1.64	0.01

## Processing Rates (in Mbytes/second)

-----  
Memory transfer speed: 5.00  
Disk read speed: 1.47  
Disk write speed: 1.92  
DSP processing speed: 0.40  
VIS processing speed: 0.39

Asynchronous sun configuration (Buffsize=256, SNM=None)

Test Case: Description		Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun01a	Sun Memory-Memory	4.28	1.28	13.11	3.06	1.64	0.38
sun02a	Sun Disk-Memory	3.77	3.60	13.11	3.47	1.64	0.43
sun03a	Sun Memory-Disk	10.17	4.32	13.11	1.29	1.64	0.16
sun04a	Sun Disk-Disk	10.74	8.63	13.11	1.22	1.64	0.15
sun05a	Sun Mem-DSP-Mem	34.76	33.03	13.11	0.38	1.64	0.05
sun06a	Sun Disk-DSP-Mem	56.37	54.65	13.11	0.23	1.64	0.03
sun07a	Sun Mem-DSP-Disk	41.59	40.52	13.11	0.32	1.64	0.04
sun08a	Sun Disk-DSP-Disk	63.80	61.05	13.11	0.21	1.64	0.03
sun09a	Sun Mem-Null-Mem	21.30	6.32	13.11	0.62	1.64	0.08
sun10a	Sun Disk-NULL-Mem	24.37	8.62	13.11	0.54	1.64	0.07
sun11a	Sun Mem-Null-Display	107.82	4.52	13.11	0.12	1.64	0.02
sun12a	Sun Disk-Null-Display	112.87	9.20	13.11	0.12	1.64	0.01
sun13a	Sun Mem-VIS-Mem	38.49	6.18	13.11	0.34	1.64	0.04
sun14a	Sun Disk-VIS-Mem	41.72	8.50	13.11	0.31	1.64	0.04
sun15a	Sun Mem-VIS-Display	333.87	6.35	13.11	0.04	1.64	0.00
sun16a	Sun Disk-VIS-Display	2117.02	10.30	13.11	0.01	1.64	0.00
sun17a	Sun Memory-Socket-Memory	8.42	2.30	13.11	1.56	1.64	0.19
sun18a	Sun Disk-Socket-Memory	19.23	6.28	13.11	0.68	1.64	0.09
sun19a	Sun Memory-Socket-Display	8.07	2.55	13.11	1.62	1.64	0.20
sun20a	Sun Disk-Socket-Display	18.83	5.65	13.11	0.70	1.64	0.09
sun21a	Sun Mem-DSP-Socket-Vis	110.39	41.68	13.11	0.12	1.64	0.01
sun22a	Sun Disk-DSP-Socket-Vis	170.20	68.13	13.11	0.08	1.64	0.01
sun23a	Sun Mem-DSP-Sck-Vis-Disp	98.63	39.17	13.11	0.13	1.64	0.02
sun24a	Sun Disk-DSP-Sck-Vis-Disp	161.41	64.53	13.11	0.08	1.64	0.01

## Processing Rates (in Mbytes/second)

-----  
Memory transfer speed: 3.06  
Disk read speed: 3.47  
Disk write speed: 1.29  
DSP processing speed: 0.43  
VIS processing speed: 0.38

Asynchronous sun configuration (Buffsize=256, SNM=None)

Test Case:	Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun01a	Sun Memory-Memory	2.41	1.70	13.11	5.45	1.64	0.68
sun02a	Sun Disk-Memory	9.23	3.27	13.11	1.42	1.64	0.18
sun03a	Sun Memory-Disk	8.10	4.18	13.11	1.62	1.64	0.20
sun04a	Sun Disk-Disk	8.63	7.72	13.11	1.52	1.64	0.19
sun05a	Sun Mem-DSP-Mem	30.55	29.43	13.11	0.43	1.64	0.05
sun06a	Sun Disk-DSP-Mem	47.77	47.48	13.11	0.27	1.64	0.03
sun07a	Sun Mem-DSP-Disk	35.74	35.35	13.11	0.37	1.64	0.05
sun08a	Sun Disk-DSP-Disk	53.45	52.75	13.11	0.25	1.64	0.03
sun09a	Sun Mem-Null-Mem	19.56	6.03	13.11	0.67	1.64	0.08
sun10a	Sun Disk-NULL-Mem	22.07	8.30	13.11	0.59	1.64	0.07
sun11a	Sun Mem-Null-Display	110.28	3.87	13.11	0.12	1.64	0.01
sun12a	Sun Disk-Null-Display	120.09	8.90	13.11	0.11	1.64	0.01
sun13a	Sun Mem-VIS-Mem	35.13	6.50	13.11	0.37	1.64	0.05
sun14a	Sun Disk-VIS-Mem	39.28	7.53	13.11	0.33	1.64	0.04
sun15a	Sun Mem-VIS-Display	45.43	6.23	13.11	0.29	1.64	0.04
sun16a	Sun Disk-VIS-Display	50.96	7.88	13.11	0.26	1.64	0.03
sun17a	Sun Memory-Socket-Memory	8.10	2.38	13.11	1.62	1.64	0.20
sun18a	Sun Disk-Socket-Memory	16.21	5.42	13.11	0.81	1.64	0.10
sun19a	Sun Memory-Socket-Display	7.08	2.37	13.11	1.85	1.64	0.23
sun20a	Sun Disk-Socket-Display	15.19	5.08	13.11	0.86	1.64	0.11
sun21a	Sun Mem-DSP-Socket-Vis	100.85	37.62	13.11	0.13	1.64	0.02
sun22a	Sun Disk-DSP-Socket-Vis	141.18	56.06	13.11	0.09	1.64	0.01
sun23a	Sun Mem-DSP-Sck-Vis-Disp	131.09	38.13	13.11	0.10	1.64	0.01
sun24a	Sun Disk-DSP-Sck-Vis-Disp	190.31	57.03	13.11	0.07	1.64	0.01

## Processing Rates (in Mbytes/second)

-----

Memory transfer speed:	5.45
Disk read speed:	1.42
Disk write speed:	1.62
DSP processing speed:	0.47
VIS processing speed:	0.40

Asynchronous sun configuration (Buffsize=256, SNM=None)

Test Case:	Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun01b	Sun Memory-Memory	1.43	1.38	13.11	9.18	1.64	1.15
sun02b	Sun Disk-Memory	3.44	3.30	13.11	3.81	1.64	0.48
sun03b	Sun Memory-Disk	7.02	6.72	13.11	1.87	1.64	0.23
sun04b	Sun Disk-Disk	10.94	10.13	13.11	1.20	1.64	0.15
sun05b	Sun Mem-DSP-Mem	62.41	60.66	13.11	0.21	1.64	0.03
sun06b	Sun Disk-DSP-Mem	92.21	89.51	13.11	0.14	1.64	0.02
sun07b	Sun Mem-DSP-Disk	78.29	75.70	13.11	0.17	1.64	0.02
sun08b	Sun Disk-DSP-Disk	101.77	99.00	13.11	0.13	1.64	0.02
sun09b	Sun Mem-Null-Mem	2.51	2.18	13.11	5.23	1.64	0.65
sun10b	Sun Disk-NULL-Mem	4.61	3.85	13.11	2.84	1.64	0.36
sun11b	Sun Mem-Null-Display	9.51	0.08	13.11	1.38	1.64	0.17
sun12b	Sun Disk-Null-Display	13.64	4.07	13.11	0.96	1.64	0.12
sun13b	Sun Mem-VIS-Mem	5.15	2.20	13.11	2.54	1.64	0.32
sun14b	Sun Disk-VIS-Mem	8.62	3.82	13.11	1.52	1.64	0.19
sun15b	Sun Mem-VIS-Display	52.26	2.13	13.11	0.25	1.64	0.03
sun16b	Sun Disk-VIS-Display	53.14	3.83	13.11	0.25	1.64	0.03
sun17b	Sun Memory-Socket-Memory	3.94	3.32	13.11	3.33	1.64	0.42
sun18b	Sun Disk-Socket-Memory	9.82	7.87	13.11	1.33	1.64	0.17
sun19b	Sun Memory-Socket-Display	7.91	4.35	13.11	1.66	1.64	0.21
sun20b	Sun Disk-Socket-Display	17.92	9.90	13.11	0.73	1.64	0.09
sun21b	Sun Mem-DSP-Socket-Vis	84.74	68.58	13.11	0.15	1.64	0.02
sun22b	Sun Disk-DSP-Socket-Vis	107.49	89.85	13.11	0.12	1.64	0.02
sun23b	Sun Mem-DSP-Sck-Vis-Disp	123.29	75.68	13.11	0.11	1.64	0.01
sun24b	Sun Disk-DSP-Sck-Vis-Disp	135.24	91.08	13.11	0.10	1.64	0.01

## Processing Rates (in Mbytes/second)

-----

Memory transfer speed:	9.18
Disk read speed:	3.81
Disk write speed	1.87
DSP processing speed:	0.21
VIS processing speed:	3.52

Asynchronous sun configuration (Buffsize=16K, SNM=None)

Test Case:	Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun01b	Sun Memory-Memory	3.65	1.47	13.11	3.59	1.64	0.45
sun02b	Sun Disk-Memory	4.10	3.58	13.11	3.20	1.64	0.40
sun03b	Sun Memory-Disk	10.55	5.22	13.11	1.24	1.64	0.16
sun04b	Sun Disk-Disk	10.35	9.12	13.11	1.27	1.64	0.16
sun05b	Sun Mem-DSP-Mem	65.10	63.00	13.11	0.20	1.64	0.03
sun06b	Sun Disk-DSP-Mem	82.90	81.38	13.11	0.16	1.64	0.02
sun07b	Sun Mem-DSP-Disk	66.59	65.50	13.11	0.20	1.64	0.02
sun08b	Sun Disk-DSP-Disk	95.64	93.36	13.11	0.14	1.64	0.02
sun09b	Sun Mem-Null-Mem	2.62	2.18	13.11	5.01	1.64	0.63
sun10b	Sun Disk-NULL-Mem	4.21	3.65	13.11	3.11	1.64	0.39
sun11b	Sun Mem-Null-Display	4.95	0.05	13.11	2.65	1.64	0.33
sun12b	Sun Disk-Null-Display	8.94	4.00	13.11	1.47	1.64	0.18
sun13b	Sun Mem-VIS-Mem	5.55	2.27	13.11	2.36	1.64	0.30
sun14b	Sun Disk-VIS-Mem	9.52	3.97	13.11	1.38	1.64	0.17
sun15b	Sun Mem-VIS-Display	41.40	2.20	13.11	0.32	1.64	0.04
sun16b	Sun Disk-VIS-Display	42.33	3.82	13.11	0.31	1.64	0.04
sun17b	Sun Memory-Socket-Memory	9.13	4.47	13.11	1.43	1.64	0.18
sun18b	Sun Disk-Socket-Memory	13.57	8.05	13.11	0.97	1.64	0.12
sun19b	Sun Memory-Socket-Display	8.89	3.32	13.11	1.47	1.64	0.18
sun20b	Sun Disk-Socket-Display	17.94	8.45	13.11	0.73	1.64	0.09
sun21b	Sun Mem-DSP-Socket-Vis	95.15	74.33	13.11	0.14	1.64	0.02
sun22b	Sun Disk-DSP-Socket-Vis	115.06	89.78	13.11	0.11	1.64	0.01
sun23b	Sun Mem-DSP-Sck-Vis-Disp	114.00	68.66	13.11	0.11	1.64	0.01
sun24b	Sun Disk-DSP-Sck-Vis-Disp	136.58	89.50	13.11	0.10	1.64	0.01

## Processing Rates (in Mbytes/second)

Memory transfer speed:	3.59
Disk read speed:	3.20
Disk write speed	1.24
DSP processing speed:	0.21
VIS processing speed:	6.90

Asynchronous sun configuration (Buffsize=16K, SNM=None)

Test Case:	Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun01b	Sun Memory-Memory	1.57	1.38	13.11	8.37	1.64	1.05
sun02b	Sun Disk-Memory	3.71	3.18	13.11	3.54	1.64	0.44
sun03b	Sun Memory-Disk	8.14	5.23	13.11	1.61	1.64	0.20
sun04b	Sun Disk-Disk	9.16	8.57	13.11	1.43	1.64	0.18
sun05b	Sun Mem-DSP-Mem	57.20	55.01	13.11	0.23	1.64	0.03
sun06b	Sun Disk-DSP-Mem	77.40	75.80	13.11	0.17	1.64	0.02
sun07b	Sun Mem-DSP-Disk	63.20	61.93	13.11	0.21	1.64	0.03
sun08b	Sun Disk-DSP-Disk	85.50	81.88	13.11	0.15	1.64	0.02
sun09b	Sun Mem-Null-Mem	2.67	2.23	13.11	4.92	1.64	0.61
sun10b	Sun Disk-NULL-Mem	4.52	3.53	13.11	2.90	1.64	0.36
sun11b	Sun Mem-Null-Display	5.16	0.03	13.11	2.54	1.64	0.32
sun12b	Sun Disk-Null-Display	9.03	3.48	13.11	1.45	1.64	0.18
sun13b	Sun Mem-VIS-Mem	5.54	2.18	13.11	2.37	1.64	0.30
sun14b	Sun Disk-VIS-Mem	8.65	3.47	13.11	1.52	1.64	0.19
sun15b	Sun Mem-VIS-Display	7.77	2.27	13.11	1.69	1.64	0.21
sun16b	Sun Disk-VIS-Display	10.13	3.38	13.11	1.29	1.64	0.16
sun17b	Sun Memory-Socket-Memory	6.32	2.88	13.11	2.07	1.64	0.26
sun18b	Sun Disk-Socket-Memory	11.42	6.62	13.11	1.15	1.64	0.14
sun19b	Sun Memory-Socket-Display	8.29	3.32	13.11	1.58	1.64	0.20
sun20b	Sun Disk-Socket-Display	15.75	7.70	13.11	0.83	1.64	0.10
sun21b	Sun Mem-DSP-Socket-Vis	89.18	68.56	13.11	0.15	1.64	0.02
sun22b	Sun Disk-DSP-Socket-Vis	106.84	84.70	13.11	0.12	1.64	0.02
sun23b	Sun Mem-DSP-Sck-Vis-Disp	90.69	65.86	13.11	0.14	1.64	0.02
sun24b	Sun Disk-DSP-Sck-Vis-Disp	108.47	81.91	13.11	0.12	1.64	0.02

## Processing Rates (in Mbytes/second)

Memory transfer speed:	8.37
Disk read speed:	3.54
Disk write speed:	1.61
DSP processing speed:	0.24
VIS processing speed:	3.30

Asynchronous sun configuration (Buffsize=16K, SNM=None)

Test Case:	Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun01c	Sun Memory-Memory	1.31	1.32	12.58	9.61	1.57	1.20
sun02c	Sun Disk-Memory	3.17	3.10	12.58	3.97	1.57	0.50
sun03c	Sun Memory-Disk	6.74	6.38	12.58	1.87	1.57	0.23
sun04c	Sun Disk-Disk	9.67	9.58	12.58	1.30	1.57	0.16
sun05c	Sun Mem-DSP-Mem	66.25	65.63	12.58	0.19	1.57	0.02
sun06c	Sun Disk-DSP-Mem	89.76	89.08	12.58	0.14	1.57	0.02
sun07c	Sun Mem-DSP-Disk	83.17	82.31	12.58	0.15	1.57	0.02
sun08c	Sun Disk-DSP-Disk	99.12	98.43	12.58	0.13	1.57	0.02
sun09c	Sun Mem-Null-Mem	2.06	2.02	12.58	6.10	1.57	0.76
sun10c	Sun Disk-NULL-Mem	3.57	3.53	12.58	3.53	1.57	0.44
sun11c	Sun Mem-Null-Display	4.77	0.03	12.58	2.64	1.57	0.33
sun12c	Sun Disk-Null-Display	7.76	3.90	12.58	1.62	1.57	0.20
sun13c	Sun Mem-VIS-Mem	4.87	2.07	12.58	2.59	1.57	0.32
sun14c	Sun Disk-VIS-Mem	7.18	3.53	12.58	1.75	1.57	0.22
sun15c	Sun Mem-VIS-Display	4.53	2.03	12.58	2.78	1.57	0.35
sun16c	Sun Disk-VIS-Display	8.85	3.53	12.58	1.42	1.57	0.18
sun17c	Sun Memory-Socket-Memory	12.41	8.07	12.58	1.01	1.57	0.13
sun18c	Sun Disk-Socket-Memory	15.33	10.50	12.58	0.82	1.57	0.10
sun19c	Sun Memory-Socket-Display	20.22	8.57	12.58	0.62	1.57	0.08
sun20c	Sun Disk-Socket-Display	20.59	10.25	12.58	0.61	1.57	0.08
sun21c	Sun Mem-DSP-Socket-Vis	84.72	73.70	12.58	0.15	1.57	0.02
sun22c	Sun Disk-DSP-Socket-Vis	104.41	93.38	12.58	0.12	1.57	0.02
sun23c	Sun Mem-DSP-Sck-Vis-Disp	89.00	73.90	12.58	0.14	1.57	0.02
sun24c	Sun Disk-DSP-Sck-Vis-Disp	110.72	93.80	12.58	0.11	1.57	0.01

## Processing Rates (in Mbytes/second)

Memory transfer speed:	9.61
Disk read speed:	3.97
Disk write speed:	1.87
DSP processing speed:	0.19
VIS processing speed:	3.53

Asynchronous sun configuration (Buffsize=128K, SNM=None)



Test Case:	Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun01c	Sun Memory-Memory	2.59	1.38	12.58	4.85	1.57	0.61
sun02c	Sun Disk-Memory	3.41	3.38	12.58	3.69	1.57	0.46
sun03c	Sun Memory-Disk	10.19	4.98	12.58	1.23	1.57	0.15
sun04c	Sun Disk-Disk	13.41	8.75	12.58	0.94	1.57	0.12
sun05c	Sun Mem-DSP-Mem	74.79	69.88	12.58	0.17	1.57	0.02
sun06c	Sun Disk-DSP-Mem	90.01	86.68	12.58	0.14	1.57	0.02
sun07c	Sun Mem-DSP-Disk	79.87	73.26	12.58	0.16	1.57	0.02
sun08c	Sun Disk-DSP-Disk	104.93	98.81	12.58	0.12	1.57	0.01
sun09c	Sun Mem-Null-Mem	2.11	2.07	12.58	5.96	1.57	0.75
sun10c	Sun Disk-NULL-Mem	3.71	3.52	12.58	3.39	1.57	0.42
sun11c	Sun Mem-Null-Display	3.78	0.02	12.58	3.33	1.57	0.42
sun12c	Sun Disk-Null-Display	7.78	3.75	12.58	1.62	1.57	0.20
sun13c	Sun Mem-VIS-Mem	4.55	2.05	12.58	2.77	1.57	0.35
sun14c	Sun Disk-VIS-Mem	7.55	3.53	12.58	1.67	1.57	0.21
sun15c	Sun Mem-VIS-Display	5.56	2.07	12.58	2.26	1.57	0.28
sun16c	Sun Disk-VIS-Display	8.56	3.70	12.58	1.47	1.57	0.18
sun17c	Sun Memory-Socket-Memory	15.27	8.05	12.58	0.82	1.57	0.10
sun18c	Sun Disk-Socket-Memory	17.80	9.95	12.58	0.71	1.57	0.09
sun19c	Sun Memory-Socket-Display	21.81	7.95	12.58	0.58	1.57	0.07
sun20c	Sun Disk-Socket-Display	22.95	9.87	12.58	0.55	1.57	0.07
sun21c	Sun Mem-DSP-Socket-Vis	97.74	79.58	12.58	0.13	1.57	0.02
sun22c	Sun Disk-DSP-Socket-Vis	109.66	91.23	12.58	0.11	1.57	0.01
sun23c	Sun Mem-DSP-Sck-Vis-Disp	99.20	79.61	12.58	0.13	1.57	0.02
sun24c	Sun Disk-DSP-Sck-Vis-Disp	111.95	93.78	12.58	0.11	1.57	0.01

## Processing Rates (in Mbytes/second)

-----  
Memory transfer speed: 4.85  
Disk read speed: 3.69  
Disk write speed: 1.23  
DSP processing speed: 0.17  
VIS processing speed: 6.42

Asynchronous sun configuration (Buffsize=128K, SNM=None)

Test Case:	Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun01c	Sun Memory-Memory	1.34	1.33	12.58	9.40	1.57	1.17
sun02c	Sun Disk-Memory	2.99	2.97	12.58	4.21	1.57	0.53
sun03c	Sun Memory-Disk	7.84	4.75	12.58	1.60	1.57	0.20
sun04c	Sun Disk-Disk	9.57	8.00	12.58	1.32	1.57	0.16
sun05c	Sun Mem-DSP-Mem	62.48	61.15	12.58	0.20	1.57	0.03
sun06c	Sun Disk-DSP-Mem	83.89	81.08	12.58	0.15	1.57	0.02
sun07c	Sun Mem-DSP-Disk	73.62	69.86	12.58	0.17	1.57	0.02
sun08c	Sun Disk-DSP-Disk	90.69	87.81	12.58	0.14	1.57	0.02
sun09c	Sun Mem-Null-Mem	2.13	2.05	12.58	5.91	1.57	0.74
sun10c	Sun Disk-NULL-Mem	3.30	3.20	12.58	3.82	1.57	0.48
sun11c	Sun Mem-Null-Display	3.87	0.00	12.58	3.26	1.57	0.41
sun12c	Sun Disk-Null-Display	6.97	3.10	12.58	1.80	1.57	0.23
sun13c	Sun Mem-VIS-Mem	4.58	2.08	12.58	2.74	1.57	0.34
sun14c	Sun Disk-VIS-Mem	6.90	3.18	12.58	1.82	1.57	0.23
sun15c	Sun Mem-VIS-Display	4.59	2.08	12.58	2.74	1.57	0.34
sun16c	Sun Disk-VIS-Display	7.04	3.13	12.58	1.79	1.57	0.22
sun17c	Sun Memory-Socket-Memory	14.82	8.23	12.58	0.85	1.57	0.11
sun18c	Sun Disk-Socket-Memory	16.48	9.95	12.58	0.76	1.57	0.10
sun19c	Sun Memory-Socket-Display	20.49	8.48	12.58	0.61	1.57	0.08
sun20c	Sun Disk-Socket-Display	22.95	9.97	12.58	0.55	1.57	0.07
sun21c	Sun Mem-DSP-Socket-Vis	89.34	73.61	12.58	0.14	1.57	0.02
sun22c	Sun Disk-DSP-Socket-Vis	100.65	86.40	12.58	0.13	1.57	0.02
sun23c	Sun Mem-DSP-Sck-Vis-Disp	86.74	71.20	12.58	0.15	1.57	0.02
sun24c	Sun Disk-DSP-Sck-Vis-Disp	102.48	86.41	12.58	0.12	1.57	0.02

## Processing Rates (in Mbytes/second)

-----  
Memory transfer speed: 9.40  
Disk read speed: 4.21  
Disk write speed: 1.60  
DSP processing speed: 0.21  
VIS processing speed: 3.88

**Asynchronous sun configuration (Buffsize=128K, SNM=None)**

## A.2

### CRAY STANDALONE TEST REPORTS

The following test reports were used in preparing the spreadsheets for the Cray standalone test results. The reports are listed in order of buffer size. These reports are for asynchronous processing. For comparison to synchronous results, refer to Appendix B.

Test Case:	Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray01a	Cray Memory-Memory	3.08	1.18	13.11	4.25	1.64	0.53
cray02a	Cray Disk-Memory	13.22	5.73	13.11	0.99	1.64	0.12
cray03a	Cray Memory-Disk	32.24	9.14	13.11	0.41	1.64	0.05
cray04a	Cray Disk-Disk	38.02	13.21	13.11	0.34	1.64	0.04
cray05a	Cray Mem-DSP-Mem	12.32	9.42	13.11	1.06	1.64	0.13
cray06a	Cray Disk-DSP-Mem	17.40	9.95	13.11	0.75	1.64	0.09
cray07a	Cray Mem-DSP-Disk	23.71	7.08	13.11	0.55	1.64	0.07
cray08a	Cray Disk-DSP-Disk	21.57	9.94	13.11	0.61	1.64	0.08

## Processing Rates (in Mbytes/second)

-----  
Memory transfer speed: 4.25  
Disk read speed: 0.99  
Disk write speed: 0.41  
DSP processing speed: 1.42  
VIS processing speed: 0.00

Asynchronous cray configuration (Buffsize=256, SNM=None, CPUS=2)

Test Case:	Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray01a	Cray Memory-Memory	3.08	1.17	13.11	4.25	1.64	0.53
cray02a	Cray Disk-Memory	13.34	5.87	13.11	0.98	1.64	0.12
cray03a	Cray Memory-Disk	28.97	9.02	13.11	0.45	1.64	0.06
cray04a	Cray Disk-Disk	34.50	12.31	13.11	0.38	1.64	0.05
cray05a	Cray Mem-DSP-Mem	12.24	8.81	13.11	1.07	1.64	0.13
cray06a	Cray Disk-DSP-Mem	17.40	10.35	13.11	0.75	1.64	0.09
cray07a	Cray Mem-DSP-Disk	38.33	12.58	13.11	0.34	1.64	0.04
cray08a	Cray Disk-DSP-Disk	43.71	12.77	13.11	0.30	1.64	0.04

## Processing Rates (in Mbytes/second)

Memory transfer speed:	4.25
Disk read speed:	0.98
Disk write speed:	0.45
DSP processing speed:	1.43
VIS processing speed:	0.00

Asynchronous cray configuration (Buffsize=256, SNM=None, CPUS=2)

Test Case:	Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray01a	Cray Memory-Memory	3.10	1.17	13.11	4.22	1.64	0.53
cray02a	Cray Disk-Memory	13.18	5.70	13.11	0.99	1.64	0.12
cray03a	Cray Memory-Disk	37.91	9.41	13.11	0.35	1.64	0.04
cray04a	Cray Disk-Disk	41.56	13.66	13.11	0.32	1.64	0.04
cray05a	Cray Mem-DSP-Mem	12.23	8.53	13.11	1.07	1.64	0.13
cray06a	Cray Disk-DSP-Mem	17.40	10.20	13.11	0.75	1.64	0.09
cray07a	Cray Mem-DSP-Disk	21.08	13.00	13.11	0.62	1.64	0.08
cray08a	Cray Disk-DSP-Disk	30.74	13.10	13.11	0.43	1.64	0.05

## Processing Rates (in Mbytes/second)

```

-----
Memory transfer speed:  4.22
Disk read speed:       0.99
Disk write speed       0.35
DSP processing speed:  1.44
VIS processing speed:  0.00

```

Asynchronous cray configuration (Bufsize=256, SNM=None, CPUS=2)

Test Case:	Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray01b	Cray Memory-Memory	0.09	0.06	13.11	140.04	1.64	17.50
cray02b	Cray Disk-Memory	0.28	0.28	13.11	46.54	1.64	5.82
cray03b	Cray Memory-Disk	4.37	1.99	13.11	3.00	1.64	0.38
cray04b	Cray Disk-Disk	0.65	0.61	13.11	20.10	1.64	2.51
cray05b	Cray Mem-DSP-Mem	3.39	3.05	13.11	3.87	1.64	0.48
cray06b	Cray Disk-DSP-Mem	3.66	3.35	13.11	3.58	1.64	0.45
cray07b	Cray Mem-DSP-Disk	4.87	4.27	13.11	2.69	1.64	0.34
cray08b	Cray Disk-DSP-Disk	3.93	3.61	13.11	3.33	1.64	0.42

## Processing Rates (in Mbytes/second)

-----  
Memory transfer speed: 140.04  
Disk read speed: 46.54  
Disk write speed: 3.00  
DSP processing speed: 3.97  
VIS processing speed: 0.00

Asynchronous cray configuration (Buffsize=16K, SNM=None, CPUS=2)

Test Case:	Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray01b	Cray Memory-Memory	0.09	0.06	13.11	141.43	1.64	17.68
cray02b	Cray Disk-Memory	0.28	0.28	13.11	46.47	1.64	5.81
cray03b	Cray Memory-Disk	2.03	1.08	13.11	6.45	1.64	0.81
cray04b	Cray Disk-Disk	0.62	0.61	13.11	21.27	1.64	2.66
cray05b	Cray Mem-DSP-Mem	3.35	3.09	13.11	3.92	1.64	0.49
cray06b	Cray Disk-DSP-Mem	3.66	3.59	13.11	3.58	1.64	0.45
cray07b	Cray Mem-DSP-Disk	4.80	4.20	13.11	2.73	1.64	0.34
cray08b	Cray Disk-DSP-Disk	3.94	3.59	13.11	3.33	1.64	0.42

## Processing Rates (in Mbytes/second)

-----

Memory transfer speed: 141.43  
 Disk read speed: 46.47  
 Disk write speed: 6.45  
 DSP processing speed: 4.02  
 VIS processing speed: 0.00

Asynchronous cray configuration (Buffsize=16K, SNM=None, CPUS=2)



Test Case:	Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray01b	Cray Memory-Memory	0.10	0.06	13.11	137.92	1.64	17.24
cray02b	Cray Disk-Memory	0.29	0.29	13.11	45.13	1.64	5.64
cray03b	Cray Memory-Disk	1.04	0.39	13.11	12.66	1.64	1.58
cray04b	Cray Disk-Disk	0.65	0.64	13.11	20.14	1.64	2.52
cray05b	Cray Mem-DSP-Mem	3.90	2.87	13.11	3.36	1.64	0.42
cray06b	Cray Disk-DSP-Mem	4.62	3.71	13.11	2.83	1.64	0.35
cray07b	Cray Mem-DSP-Disk	5.55	3.23	13.11	2.36	1.64	0.30
cray08b	Cray Disk-DSP-Disk	5.66	2.28	13.11	2.32	1.64	0.29

## Processing Rates (in Mbytes/second)

-----  
Memory transfer speed: 137.92  
Disk read speed: 45.13  
Disk write speed 12.66  
DSP processing speed: 3.45  
VIS processing speed: 0.00

**Asynchronous cray configuration (Buffsize=16K, SNM=None, CPUS=2)**

Test Case:	Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray01c	Cray Memory-Memory	0.05	0.04	12.58	273.58	1.57	34.20
cray02c	Cray Disk-Memory	0.27	0.19	12.58	45.97	1.57	5.75
cray03c	Cray Memory-Disk	1.18	0.95	12.58	10.71	1.57	1.34
cray04c	Cray Disk-Disk	0.42	0.40	12.58	30.00	1.57	3.75
cray05c	Cray Mem-DSP-Mem	3.10	2.29	12.58	4.05	1.57	0.51
cray06c	Cray Disk-DSP-Mem	3.28	3.31	12.58	3.84	1.57	0.48
cray07c	Cray Mem-DSP-Disk	10.96	4.46	12.58	1.15	1.57	0.14
cray08c	Cray Disk-DSP-Disk	9.97	2.92	12.58	1.26	1.57	0.16

## Processing Rates (in Mbytes/second)

-----  
Memory transfer speed: 273.58  
Disk read speed: 45.97  
Disk write speed: 10.71  
DSP processing speed: 4.12  
VIS processing speed: 0.00

Asynchronous cray configuration (Buffsize=128K, SNM=None, CPUS=2)

Test Case:	Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray01c	Cray Memory-Memory	0.05	0.04	12.58	265.75	1.57	33.22
cray02c	Cray Disk-Memory	0.19	0.18	12.58	66.66	1.57	8.33
cray03c	Cray Memory-Disk	1.23	0.98	12.58	10.26	1.57	1.28
cray04c	Cray Disk-Disk	0.41	0.40	12.58	30.56	1.57	3.82
cray05c	Cray Mem-DSP-Mem	3.15	3.03	12.58	3.99	1.57	0.50
cray06c	Cray Disk-DSP-Mem	3.31	2.60	12.58	3.80	1.57	0.48
cray07c	Cray Mem-DSP-Disk	4.58	3.61	12.58	2.75	1.57	0.34
cray08c	Cray Disk-DSP-Disk	3.52	3.22	12.58	3.57	1.57	0.45

## Processing Rates (in Mbytes/second)

Memory transfer speed: 265.75  
Disk read speed: 66.66  
Disk write speed: 10.26  
DSP processing speed: 4.06  
VIS processing speed: 0.00

Asynchronous cray configuration (Buffsize=128K, SNM=None, CPUS=2)

Test Case:	Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray01c	Cray Memory-Memory	0.05	0.04	12.58	274.98	1.57	34.37
cray02c	Cray Disk-Memory	0.19	0.18	12.58	66.58	1.57	8.32
cray03c	Cray Memory-Disk	1.27	0.97	12.58	9.89	1.57	1.24
cray04c	Cray Disk-Disk	0.41	0.40	12.58	30.52	1.57	3.81
cray05c	Cray Mem-DSP-Mem	3.18	2.38	12.58	3.96	1.57	0.50
cray06c	Cray Disk-DSP-Mem	3.30	3.33	12.58	3.81	1.57	0.48
cray07c	Cray Mem-DSP-Disk	4.64	3.80	12.58	2.71	1.57	0.34
cray08c	Cray Disk-DSP-Disk	3.54	2.56	12.58	3.55	1.57	0.44

## Processing Rates (in Mbytes/second)

-----  
Memory transfer speed: 274.98  
Disk read speed: 66.58  
Disk write speed 9.89  
DSP processing speed: 4.02  
VIS processing speed: 0.00

**Asynchronous cray configuration (Buffsize=128K, SNM=None, CPUS=2)**

### A.3

#### CONVEX STANDALONE TEST REPORTS

The following test reports were used in preparing the spreadsheets for the Convex standalone test results. The reports are listed in order of buffer size. These reports are for asynchronous processing. For comparison to synchronous results, refer to Appendix B.

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cvx01a	Cvx Memory-Memory	0.73	0.37	13.11	18.03	1.64	2.25
cvx02a	Cvx Disk-Memory	6.05	3.53	13.11	2.17	1.64	0.27
cvx03a	Cvx Memory-Disk	9.26	3.55	13.11	1.42	1.64	0.18
cvx04a	Cvx Disk-Disk	13.96	6.33	13.11	0.94	1.64	0.12
cvx05a	Cvx Mem-DSP-Mem	6.04	5.33	13.11	2.17	1.64	0.27
cvx06a	Cvx Disk-DSP-Mem	13.72	8.70	13.11	0.96	1.64	0.12
cvx07a	Cvx Mem-DSP-Disk	15.63	9.10	13.11	0.84	1.64	0.10
cvx08a	Cvx Disk-DSP-Disk	20.53	11.57	13.11	0.64	1.64	0.08
cvx09a	Cvx Mem-Null-Mem	302.71	7.63	13.11	0.04	1.64	0.01
cvx10a	Cvx Disk-NULL-Mem	255.97	7.67	13.11	0.05	1.64	0.01
cvx11a	Cvx Mem-Null-Display	622.83	6.67	13.11	0.02	1.64	0.00
cvx12a	Cvx Disk-Null-Display	610.72	7.00	13.11	0.02	1.64	0.00
cvx13a		0.00	0.00	0.00	0.00	0.00	0.00
cvx14a		0.00	0.00	0.00	0.00	0.00	0.00
cvx15a		0.00	0.00	0.00	0.00	0.00	0.00
cvx16a		0.00	0.00	0.00	0.00	0.00	0.00
cvx17a	Cvx Memory-Socket-Memory	7.03	2.90	13.11	1.86	1.64	0.23
cvx18a	Cvx Disk-Socket-Memory	11.41	6.23	13.11	1.15	1.64	0.14
cvx19a	Cvx Memory-Socket-Display	7.57	3.07	13.11	1.73	1.64	0.22
cvx20a	Cvx Disk-Socket-Display	12.37	6.18	13.11	1.06	1.64	0.13
cvx21a	Cvx Mem-DSP-Socket-Vis	13.89	8.13	13.11	0.94	1.64	0.12
cvx22a	Cvx Disk-DSP-Socket-Vis	19.22	11.47	13.11	0.68	1.64	0.09
cvx23a	Cvx Mem-DSP-Sck-Vis-Disp	12.98	8.25	13.11	1.01	1.64	0.13
cvx24a	Cvx Disk-DSP-Sck-Vis-Disp	19.05	11.53	13.11	0.69	1.64	0.09

## Processing Rates (in Mbytes/second)

-----  
Memory transfer speed: 18.03  
Disk read speed: 2.17  
Disk write speed 1.42  
DSP processing speed: 2.47  
VIS processing speed: -17.96

**Asynchronous cvx configuration (Buffsize=256, SNM=None)**

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cvx01a	Cvx Memory-Memory	0.79	0.43	13.11	16.67	1.64	2.08
cvx02a	Cvx Disk-Memory	8.00	2.98	13.11	1.64	1.64	0.20
cvx03a	Cvx Memory-Disk	11.26	2.98	13.11	1.16	1.64	0.15
cvx04a	Cvx Disk-Disk	13.98	5.90	13.11	0.94	1.64	0.12
cvx05a	Cvx Mem-DSP-Mem	8.44	4.80	13.11	1.55	1.64	0.19
cvx06a	Cvx Disk-DSP-Mem	17.30	8.25	13.11	0.76	1.64	0.09
cvx07a	Cvx Mem-DSP-Disk	17.34	8.25	13.11	0.76	1.64	0.09
cvx08a	Cvx Disk-DSP-Disk	23.25	10.85	13.11	0.56	1.64	0.07
cvx09a	Cvx Mem-Null-Mem	273.10	6.75	13.11	0.05	1.64	0.01
cvx10a	Cvx Disk-NULL-Mem	295.11	6.90	13.11	0.04	1.64	0.01
cvx11a	Cvx Mem-Null-Display	572.74	6.40	13.11	0.02	1.64	0.00
cvx12a	Cvx Disk-Null-Display	577.37	6.77	13.11	0.02	1.64	0.00
cvx13a		0.00	0.00	0.00	0.00	0.00	0.00
cvx14a		0.00	0.00	0.00	0.00	0.00	0.00
cvx15a		0.00	0.00	0.00	0.00	0.00	0.00
cvx16a		0.00	0.00	0.00	0.00	0.00	0.00
cvx17a	Cvx Memory-Socket-Memory	10.56	2.83	13.11	1.24	1.64	0.16
cvx18a	Cvx Disk-Socket-Memory	18.99	6.10	13.11	0.69	1.64	0.09
cvx19a	Cvx Memory-Socket-Display	8.70	2.87	13.11	1.51	1.64	0.19
cvx20a	Cvx Disk-Socket-Display	20.58	6.17	13.11	0.64	1.64	0.08
cvx21a	Cvx Mem-DSP-Socket-Vis	21.98	7.75	13.11	0.60	1.64	0.07
cvx22a	Cvx Disk-DSP-Socket-Vis	32.01	10.93	13.11	0.41	1.64	0.05
cvx23a	Cvx Mem-DSP-Sck-Vis-Disp	23.27	7.80	13.11	0.56	1.64	0.07
cvx24a	Cvx Disk-DSP-Sck-Vis-Disp	34.20	11.00	13.11	0.38	1.64	0.05

## Processing Rates (in Mbytes/second)

Memory transfer speed: 16.67  
 Disk read speed: 1.64  
 Disk write speed: 1.16  
 DSP processing speed: 1.71  
 VIS processing speed: -16.59

Asynchronous cvx configuration (Buffsize=256, SNM=None)

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cvx01a	Cvx Memory-Memory	0.81	0.40	13.11	16.21	1.64	2.03
cvx02a	Cvx Disk-Memory	7.89	3.63	13.11	1.66	1.64	0.21
cvx03a	Cvx Memory-Disk	12.07	3.40	13.11	1.09	1.64	0.14
cvx04a	Cvx Disk-Disk	15.05	7.07	13.11	0.87	1.64	0.11
cvx05a	Cvx Mem-DSP-Mem	5.62	5.20	13.11	2.33	1.64	0.29
cvx06a	Cvx Disk-DSP-Mem	19.27	9.10	13.11	0.68	1.64	0.09
cvx07a	Cvx Mem-DSP-Disk	16.95	9.22	13.11	0.77	1.64	0.10
cvx08a	Cvx Disk-DSP-Disk	24.46	12.47	13.11	0.54	1.64	0.07
cvx09a	Cvx Mem-Null-Mem	318.44	7.47	13.11	0.04	1.64	0.01
cvx10a	Cvx Disk-NULL-Mem	361.10	7.70	13.11	0.04	1.64	0.00
cvx11a	Cvx Mem-Null-Display	586.31	6.77	13.11	0.02	1.64	0.00
cvx12a	Cvx Disk-Null-Display	584.49	7.18	13.11	0.02	1.64	0.00
cvx13a	Cvx Mem-VIS-Mem	865.72	7.33	13.11	0.02	1.64	0.00
cvx14a		0.00	0.00	0.00	0.00	0.00	0.00
cvx15a		0.00	0.00	0.00	0.00	0.00	0.00
cvx16a		0.00	0.00	0.00	0.00	0.00	0.00
cvx17a	Cvx Memory-Socket-Memory	10.98	3.62	13.11	1.19	1.64	0.15
cvx18a	Cvx Disk-Socket-Memory	22.01	7.27	13.11	0.60	1.64	0.07
cvx19a	Cvx Memory-Socket-Display	10.95	3.47	13.11	1.20	1.64	0.15
cvx20a	Cvx Disk-Socket-Display	23.78	7.23	13.11	0.55	1.64	0.07
cvx21a	Cvx Mem-DSP-Socket-Vis	22.40	8.72	13.11	0.59	1.64	0.07
cvx22a	Cvx Disk-DSP-Socket-Vis	33.83	12.37	13.11	0.39	1.64	0.05
cvx23a	Cvx Mem-DSP-Sck-Vis-Disp	24.31	8.83	13.11	0.54	1.64	0.07
cvx24a		0.00	0.00	0.00	0.00	0.00	0.00

## Processing Rates (in Mbytes/second)

-----  
Memory transfer speed: 16.21  
Disk read speed: 1.66  
Disk write speed: 1.09  
DSP processing speed: 2.73  
VIS processing speed: 0.02

Asynchronous cvx configuration (Buffsize=256, SNM=None)



Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cvx01b	Convex Memory-Memory	0.05	0.07	13.11	259.85	1.64	32.48
cvx02b	Convex Disk-Memory	0.25	0.13	13.11	51.41	1.64	6.43
cvx03b	Convex Memory-Disk	0.25	0.15	13.11	52.68	1.64	6.58
cvx04b	Convex Disk-Disk	0.78	0.28	13.11	16.70	1.64	2.09
cvx05b	Convex Mem-DSP-Mem	2.23	4.30	13.11	5.87	1.64	0.73
cvx06b	Convex Disk-DSP-Mem	2.59	4.65	13.11	5.06	1.64	0.63
cvx07b	Convex Mem-DSP-Disk	2.98	4.75	13.11	4.40	1.64	0.55
cvx08b	Convex Disk-DSP-Disk	2.93	4.85	13.11	4.48	1.64	0.56
cvx09b	Convex Mem-Null-Mem	4.23	0.40	13.11	3.10	1.64	0.39
cvx10b	Convex Disk-NULL-Mem	4.11	0.38	13.11	3.19	1.64	0.40
cvx11b	Convex Mem-Null-Display	8.96	0.12	13.11	1.46	1.64	0.18
cvx12b	Convex Disk-Null-Display	8.88	0.37	13.11	1.48	1.64	0.18
cvx13b	Convex Mem-VIS-Mem	7.17	0.40	13.11	1.83	1.64	0.23
cvx14b	Convex Disk-VIS-Mem	6.64	0.38	13.11	1.98	1.64	0.25
cvx15b	Convex Mem-VIS-Display	7.91	0.42	13.11	1.66	1.64	0.21
cvx16b		0.00	0.00	0.00	0.00	0.00	0.00
cvx17b	Convex Memory-Socket-Memory	4.33	0.28	13.11	3.03	1.64	0.3
8							
cvx18b	Convex Disk-Socket-Memory	4.88	0.47	13.11	2.69	1.64	0.34
cvx19b	Convex Memory-Socket-Display	4.23	0.57	13.11	3.10	1.64	0.
39							
cvx20b	Convex Disk-Socket-Display	4.23	0.52	13.11	3.10	1.64	0.39
cvx21b	Convex Mem-DSP-Socket-Vis	34.15	7.57	13.11	0.38	1.64	0.05
cvx22b	Convex Disk-DSP-Socket-Vis	35.98	7.88	13.11	0.36	1.64	0.05
cvx23b	Convex Mem-DSP-Sck-Vis-Disp	35.94	6.90	13.11	0.36	1.64	0.0
5							
cvx24b	Convex Disk-DSP-Sck-Vis-Disp	43.86	7.50	13.11	0.30	1.64	0.
04							

## Processing Rates (in Mbytes/second)

-----  
Memory transfer speed: 259.85  
Disk read speed: 51.41  
Disk write speed: 52.68  
DSP processing speed: 6.01  
VIS processing speed: 1.84

Asynch. Convex configuration (Buffsize=16K, SNM = None)

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cvx01b	Cvx Memory-Memory	0.05	0.12	13.11	252.63	1.64	31.58
cvx02b	Cvx Disk-Memory	0.40	0.13	13.11	32.68	1.64	4.08
cvx03b	Cvx Memory-Disk	0.25	0.15	13.11	52.60	1.64	6.58
cvx04b	Cvx Disk-Disk	0.46	0.28	13.11	28.51	1.64	3.56
cvx05b	Cvx Mem-DSP-Mem	2.23	4.35	13.11	5.88	1.64	0.73
cvx06b	Cvx Disk-DSP-Mem	2.99	4.70	13.11	4.38	1.64	0.55
cvx07b	Cvx Mem-DSP-Disk	2.64	4.73	13.11	4.96	1.64	0.62
cvx08b	Cvx Disk-DSP-Disk	2.89	4.83	13.11	4.53	1.64	0.57
cvx09b	Cvx Mem-Null-Mem	5.37	0.42	13.11	2.44	1.64	0.30
cvx10b	Cvx Disk-NULL-Mem	3.64	0.37	13.11	3.60	1.64	0.45
cvx11b	Cvx Mem-Null-Display	8.85	0.12	13.11	1.48	1.64	0.19
cvx12b	Cvx Disk-Null-Display	9.25	0.37	13.11	1.42	1.64	0.18
cvx13b	Cvx Mem-VIS-Mem	7.42	0.42	13.11	1.77	1.64	0.22
cvx14b	Cvx Disk-VIS-Mem	7.79	0.38	13.11	1.68	1.64	0.21
cvx15b	Cvx Mem-VIS-Display	7.60	0.40	13.11	1.73	1.64	0.22
cvx16b	Cvx Disk-VIS-Display	7.38	0.38	13.11	1.77	1.64	0.22
cvx17b	Cvx Memory-Socket-Memory	2.90	0.35	13.11	4.52	1.64	0.57
cvx18b	Cvx Disk-Socket-Memory	6.06	1.13	13.11	2.16	1.64	0.27
cvx19b	Cvx Memory-Socket-Display	8.04	0.90	13.11	1.63	1.64	0.20
cvx20b	Cvx Disk-Socket-Display	9.64	1.07	13.11	1.36	1.64	0.17
cvx21b	Cvx Mem-DSP-Socket-Vis	40.04	8.28	13.11	0.33	1.64	0.04
cvx22b	Cvx Disk-DSP-Socket-Vis	39.41	7.70	13.11	0.33	1.64	0.04
cvx23b	Cvx Mem-DSP-Sck-Vis-Disp	53.18	7.58	13.11	0.25	1.64	0.03
cvx24b	Cvx Disk-DSP-Sck-Vis-Disp	45.38	7.67	13.11	0.29	1.64	0.04

## Processing Rates (in Mbytes/second)

Memory transfer speed: 252.63  
 Disk read speed: 32.68  
 Disk write speed: 52.60  
 DSP processing speed: 6.01  
 VIS processing speed: 1.78

Asynchronous cvx configuration (Buffsize=16K, SNM=None)

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cvx01b	Cvx Memory-Memory	0.06	0.05	13.11	202.98	1.64	25.37
cvx02b	Cvx Disk-Memory	0.85	0.13	13.11	15.33	1.64	1.92
cvx03b	Cvx Memory-Disk	2.84	0.15	13.11	4.61	1.64	0.58
cvx04b	Cvx Disk-Disk	0.66	0.27	13.11	19.94	1.64	2.49
cvx05b	Cvx Mem-DSP-Mem	5.10	4.27	13.11	2.57	1.64	0.32
cvx06b	Cvx Disk-DSP-Mem	5.49	4.55	13.11	2.39	1.64	0.30
cvx07b	Cvx Mem-DSP-Disk	5.63	4.57	13.11	2.33	1.64	0.29
cvx08b	Cvx Disk-DSP-Disk	6.23	4.65	13.11	2.11	1.64	0.26
cvx09b	Cvx Mem-Null-Mem	4.28	0.42	13.11	3.06	1.64	0.38
cvx10b	Cvx Disk-NULL-Mem	5.30	0.37	13.11	2.47	1.64	0.31
cvx11b	Cvx Mem-Null-Display	9.07	0.10	13.11	1.45	1.64	0.18
cvx12b	Cvx Disk-Null-Display	8.84	0.35	13.11	1.48	1.64	0.19
cvx13b	Cvx Mem-VIS-Mem	9.93	0.40	13.11	1.32	1.64	0.17
cvx14b	Cvx Disk-VIS-Mem	9.32	0.38	13.11	1.41	1.64	0.18
cvx15b	Cvx Mem-VIS-Display	9.19	0.40	13.11	1.43	1.64	0.18
cvx16b	Cvx Disk-VIS-Display	9.96	0.37	13.11	1.32	1.64	0.16
cvx17b	Cvx Memory-Socket-Memory	4.27	0.23	13.11	3.07	1.64	0.38
cvx18b	Cvx Disk-Socket-Memory	6.16	0.92	13.11	2.13	1.64	0.27
cvx19b	Cvx Memory-Socket-Display	5.10	0.57	13.11	2.57	1.64	0.32
cvx20b	Cvx Disk-Socket-Display	11.10	0.53	13.11	1.18	1.64	0.15
cvx21b	Cvx Mem-DSP-Socket-Vis	39.14	7.73	13.11	0.33	1.64	0.04
cvx22b	Cvx Disk-DSP-Socket-Vis	36.75	8.02	13.11	0.36	1.64	0.04
cvx23b	Cvx Mem-DSP-Sck-Vis-Disp	37.29	7.00	13.11	0.35	1.64	0.04
cvx24b	Cvx Disk-DSP-Sck-Vis-Disp	37.47	7.18	13.11	0.35	1.64	0.04

## Processing Rates (in Mbytes/second)

Memory transfer speed: 202.98  
 Disk read speed: 15.33  
 Disk write speed: 4.61  
 DSP processing speed: 2.60  
 VIS processing speed: 1.33

Asynchronous cvx configuration (Buffsize=16K, SNM=None)

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cvx01c	Cvx Memory-Memory	0.04	0.08	12.58	318.27	1.57	39.78
cvx02c	Cvx Disk-Memory	0.16	0.08	12.58	77.92	1.57	9.74
cvx03c	Cvx Memory-Disk	1.54	0.10	12.58	8.18	1.57	1.02
cvx04c	Cvx Disk-Disk	0.31	0.18	12.58	40.56	1.57	5.07
cvx05c	Cvx Mem-DSP-Mem	2.42	4.67	12.58	5.19	1.57	0.65
cvx06c	Cvx Disk-DSP-Mem	2.85	4.87	12.58	4.42	1.57	0.55
cvx07c	Cvx Mem-DSP-Disk	2.99	5.32	12.58	4.21	1.57	0.53
cvx08c	Cvx Disk-DSP-Disk	8.33	5.00	12.58	1.51	1.57	0.19
cvx09c	Cvx Mem-Null-Mem	1.84	0.32	12.58	6.83	1.57	0.85
cvx10c	Cvx Disk-NULL-Mem	6.37	1.48	12.58	1.97	1.57	0.25
cvx11c	Cvx Mem-Null-Display	6.43	0.02	12.58	1.96	1.57	0.24
cvx12c	Cvx Disk-Null-Display	5.07	1.07	12.58	2.48	1.57	0.31
cvx13c	Cvx Mem-VIS-Mem	1.14	0.32	12.58	11.00	1.57	1.37
cvx14c	Cvx Disk-VIS-Mem	1.71	1.02	12.58	7.35	1.57	0.92
cvx15c	Cvx Mem-VIS-Display	0.84	0.32	12.58	15.01	1.57	1.88
cvx16c	Cvx Disk-VIS-Display	0.72	0.15	12.58	17.36	1.57	2.17
cvx17c	Cvx Memory-Socket-Memory	9.16	3.77	12.58	1.37	1.57	0.17
cvx18c	Cvx Disk-Socket-Memory	6.83	3.25	12.58	1.84	1.57	0.23
cvx19c	Cvx Memory-Socket-Display	13.47	2.55	12.58	0.93	1.57	0.12
cvx20c	Cvx Disk-Socket-Display	14.30	3.20	12.58	0.88	1.57	0.11
cvx21c	Cvx Mem-DSP-Socket-Vis	14.95	8.42	12.58	0.84	1.57	0.11
cvx22c	Cvx Disk-DSP-Socket-Vis	15.45	8.37	12.58	0.81	1.57	0.10
cvx23c	Cvx Mem-DSP-Sck-Vis-Disp	15.38	8.15	12.58	0.82	1.57	0.10
cvx24c	Cvx Disk-DSP-Sck-Vis-Disp	28.11	8.48	12.58	0.45	1.57	0.06

## Processing Rates (in Mbytes/second)

-----  
Memory transfer speed: 318.27  
Disk read speed: 77.92  
Disk write speed: 8.18  
DSP processing speed: 5.29  
VIS processing speed: 11.44

Asynchronous cvx configuration (Buffsize=128K, SNM=None)

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cvx01c	Cvx Memory-Memory	0.06	0.05	12.58	201.40	1.57	25.17
cvx02c	Cvx Disk-Memory	0.21	0.08	12.58	60.45	1.57	7.56
cvx03c	Cvx Memory-Disk	0.33	0.08	12.58	37.59	1.57	4.70
cvx04c	Cvx Disk-Disk	0.41	0.20	12.58	30.37	1.57	3.80
cvx05c	Cvx Mem-DSP-Mem	5.99	4.50	12.58	2.10	1.57	0.26
cvx06c	Cvx Disk-DSP-Mem	6.28	4.62	12.58	2.00	1.57	0.25
cvx07c	Cvx Mem-DSP-Disk	6.62	5.03	12.58	1.90	1.57	0.24
cvx08c	Cvx Disk-DSP-Disk	6.60	4.75	12.58	1.91	1.57	0.24
cvx09c	Cvx Mem-Null-Mem	0.79	0.32	12.58	15.90	1.57	1.99
cvx10c	Cvx Disk-NULL-Mem	0.62	0.17	12.58	20.44	1.57	2.56
cvx11c	Cvx Mem-Null-Display	3.06	0.02	12.58	4.12	1.57	0.51
cvx12c	Cvx Disk-Null-Display	3.06	0.17	12.58	4.11	1.57	0.51
cvx13c	Cvx Mem-VIS-Mem	0.99	0.32	12.58	12.70	1.57	1.59
cvx14c	Cvx Disk-VIS-Mem	0.76	0.17	12.58	16.64	1.57	2.08
cvx15c	Cvx Mem-VIS-Display	0.90	0.32	12.58	13.91	1.57	1.74
cvx16c	Cvx Disk-VIS-Display	1.00	0.17	12.58	12.57	1.57	1.57
cvx17c	Cvx Memory-Socket-Memory	8.48	3.75	12.58	1.48	1.57	0.19
cvx18c	Cvx Disk-Socket-Memory	8.03	3.78	12.58	1.57	1.57	0.20
cvx19c	Cvx Memory-Socket-Display	11.52	3.53	12.58	1.09	1.57	0.14
cvx20c	Cvx Disk-Socket-Display	10.62	3.62	12.58	1.18	1.57	0.15
cvx21c	Cvx Mem-DSP-Socket-Vis	17.63	8.40	12.58	0.71	1.57	0.09
cvx22c	Cvx Disk-DSP-Socket-Vis	16.89	8.32	12.58	0.74	1.57	0.09
cvx23c	Cvx Mem-DSP-Sck-Vis-Disp	17.80	8.40	12.58	0.71	1.57	0.09
cvx24c	Cvx Disk-DSP-Sck-Vis-Disp	18.81	8.38	12.58	0.67	1.57	0.08

## Processing Rates (in Mbytes/second)

-----  
Memory transfer speed: 201.40  
Disk read speed: 60.45  
Disk write speed: 37.59  
DSP processing speed: 2.12  
VIS processing speed: 13.53

**Asynchronous cvx configuration (Buffsize=128K, SNM=None)**

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cvx01c	Cvx Memory-Memory	0.04	0.07	12.58	316.36	1.57	39.55
cvx02c	Cvx Disk-Memory	0.15	0.08	12.58	82.43	1.57	10.30
cvx03c	Cvx Memory-Disk	0.16	0.08	12.58	77.74	1.57	9.72
cvx04c	Cvx Disk-Disk	0.28	0.20	12.58	45.47	1.57	5.68
cvx05c	Cvx Mem-DSP-Mem	2.84	4.62	12.58	4.43	1.57	0.55
cvx06c	Cvx Disk-DSP-Mem	2.63	4.88	12.58	4.79	1.57	0.60
cvx07c	Cvx Mem-DSP-Disk	3.09	5.30	12.58	4.08	1.57	0.51
cvx08c	Cvx Disk-DSP-Disk	2.92	4.98	12.58	4.32	1.57	0.54
cvx09c	Cvx Mem-Null-Mem	1.12	0.32	12.58	11.21	1.57	1.40
cvx10c	Cvx Disk-NULL-Mem	0.62	0.17	12.58	20.44	1.57	2.56
cvx11c	Cvx Mem-Null-Display	2.93	0.02	12.58	4.30	1.57	0.54
cvx12c	Cvx Disk-Null-Display	3.19	0.17	12.58	3.94	1.57	0.49
cvx13c	Cvx Mem-VIS-Mem	1.59	0.32	12.58	7.92	1.57	0.99
cvx14c	Cvx Disk-VIS-Mem	3.32	1.12	12.58	3.79	1.57	0.47
cvx15c	Cvx Mem-VIS-Display	1.87	0.30	12.58	6.72	1.57	0.84
cvx16c	Cvx Disk-VIS-Display	2.63	1.12	12.58	4.79	1.57	0.60
cvx17c	Cvx Memory-Socket-Memory	11.05	2.98	12.58	1.14	1.57	0.14
cvx18c		0.00	0.00	0.00	0.00	0.00	0.00
cvx19c	Cvx Memory-Socket-Display	14.06	3.88	12.58	0.90	1.57	0.11
cvx20c	Cvx Disk-Socket-Display	9.19	2.90	12.58	1.37	1.57	0.17
cvx21c	Cvx Mem-DSP-Socket-Vis	14.06	8.50	12.58	0.90	1.57	0.11
cvx22c	Cvx Disk-DSP-Socket-Vis	14.60	8.50	12.58	0.86	1.57	0.11
cvx23c	Cvx Mem-DSP-Sck-Vis-Disp	21.41	8.55	12.58	0.59	1.57	0.07
cvx24c	Cvx Disk-DSP-Sck-Vis-Disp	18.30	8.50	12.58	0.69	1.57	0.09

## Processing Rates (in Mbytes/second)

-----  
Memory transfer speed: 316.36  
Disk read speed: 82.43  
Disk write speed: 77.74  
DSP processing speed: 4.49  
VIS processing speed: 8.12

**Asynchronous cvx configuration (Buffsize=128K, SNM=None)**

#### A.4

#### **SUN-SUN NETWORKED TEST REPORTS**

The following test reports were used in preparing the spreadsheets for the Sun-Sun networked test results. The reports are listed in order of buffer size. These reports are for asynchronous processing. For comparison to synchronous results, refer to Appendix B.

Test Case: Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun_sun01a Sun-Sun Memory-Net-Memory	7.74	2.40	13.11	1.69	1.64	0.21
sun_sun02a Sun-Sun Disk-Net-Memory	10.50	5.90	13.11	1.25	1.64	0.16
sun_sun03a Sun-Sun Memory-Net-Disp	4.68	2.08	13.11	2.80	1.64	0.35
sun_sun04a Sun-Sun Disk-Net-Disp	7.17	4.53	13.11	1.83	1.64	0.23
sun_sun05a Sun-Sun Mem-DSP-Net-Vis	58.77	56.83	13.11	0.22	1.64	0.03
sun_sun06a Sun-Sun Disk-DSP-Net-Vis	62.01	58.58	13.11	0.21	1.64	0.03
sun_sun07a Sun-Sun M-DSP-Net-VDisp	60.74	56.10	13.11	0.22	1.64	0.03
sun_sun08a Sun-Sun D-DSP-Net-VDisp	62.52	57.78	13.11	0.21	1.64	0.03

## Processing Rates (in Mbytes/second)

Network speed:	1.69
DSP-VIS speed:	0.26

Asynchronous sun\_sun configuration (Buffsize=256, SNM=None)



Test Case: Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun_sun01a Sun-Sun Memory-Net-Memory	6.58	2.47	13.11	1.99	1.64	0.25
sun_sun02a Sun-Sun Disk-Net-Memory	11.10	6.00	13.11	1.18	1.64	0.15
sun_sun03a Sun-Sun Memory-Net-Disp	4.85	2.05	13.11	2.70	1.64	0.34
sun_sun04a Sun-Sun Disk-Net-Disp	7.63	4.58	13.11	1.72	1.64	0.21
sun_sun05a Sun-Sun Mem-DSP-Net-Vis	63.15	56.93	13.11	0.21	1.64	0.03
sun_sun06a Sun-Sun Disk-DSP-Net-Vis	62.60	58.56	13.11	0.21	1.64	0.03
sun_sun07a Sun-Sun M-DSP-Net-VDisp	60.52	56.11	13.11	0.22	1.64	0.03
sun_sun08a Sun-Sun D-DSP-Net-VDisp	62.18	57.83	13.11	0.21	1.64	0.03

Processing Rates (in Mbytes/second)

-----  
 Network speed: 1.99  
 DSP-VIS speed: 0.23

**Asynchronous sun\_sun configuration (Buffsize=256, SNM=None)**

Test Case:	Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun_sun01a	Sun-Sun Memory-Net-Memory	4.46	2.38	13.11	2.94	1.64	0.37
sun_sun02a	Sun-Sun Disk-Net-Memory	10.68	6.33	13.11	1.23	1.64	0.15
sun_sun03a	Sun-Sun Memory-Net-Disp	5.09	1.92	13.11	2.58	1.64	0.32
sun_sun04a	Sun-Sun Disk-Net-Disp	8.08	4.55	13.11	1.62	1.64	0.20
sun_sun05a	Sun-Sun Mem-DSP-Net-Vis	40.04	34.92	13.11	0.33	1.64	0.04
sun_sun06a	Sun-Sun Disk-DSP-Net-Vis	55.71	52.00	13.11	0.24	1.64	0.03
sun_sun07a	Sun-Sun M-DSP-Net-VDisp	38.70	34.35	13.11	0.34	1.64	0.04
sun_sun08a	Sun-Sun D-DSP-Net-VDisp	55.95	51.21	13.11	0.23	1.64	0.03

## Processing Rates (in Mbytes/second)

Network speed:	2.94
DSP-VIS speed:	0.37

Asynchronous sun\_sun configuration (Buffsize=256, SNM=None)

Test Case:	Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun_sunf01a	Sun-Sun Memory-Net-Memory	7.88	2.43	13.11	1.66	1.64	0.21
sun_sunf02a	Sun-Sun Disk-Net-Memory	7.67	5.58	13.11	1.71	1.64	0.21
sun_sunf03a	Sun-Sun Memory-Net-Disp	4.54	2.10	13.11	2.88	1.64	0.36
sun_sunf04a	Sun-Sun Disk-Net-Disp	7.46	4.65	13.11	1.76	1.64	0.22
sun_sunf05a	Sun-Sun Mem-DSP-Net-Vis	62.28	56.81	13.11	0.21	1.64	0.03
sun_sunf06a	Sun-Sun Disk-DSP-Net-Vis	62.73	58.56	13.11	0.21	1.64	0.03
sun_sunf07a	Sun-Sun M-DSP-Net-VDISP	60.04	56.00	13.11	0.22	1.64	0.03
sun_sunf08a	Sun-Sun D-DSP-Net-VDISP	62.18	57.91	13.11	0.21	1.64	0.03

## Processing Rates (in Mbytes/second)

Network speed:	1.66
DSP-VIS speed:	0.24

Asynchronous sun\_sun (FDDI) configuration (Bufsize=256, SNM=None)

Test Case: Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun_sunf01a Sun-Sun Memory-Net-Memory	7.06	2.45	13.11	1.86	1.64	0.23
sun_sunf02a Sun-Sun Disk-Net-Memory	8.11	5.67	13.11	1.62	1.64	0.20
sun_sunf03a Sun-Sun Memory-Net-Disp	4.92	2.15	13.11	2.67	1.64	0.33
sun_sunf04a Sun-Sun Disk-Net-Disp	6.88	4.57	13.11	1.90	1.64	0.24
sun_sunf05a Sun-Sun Mem-DSP-Net-Vis	60.92	56.70	13.11	0.22	1.64	0.03
sun_sunf06a Sun-Sun Disk-DSP-Net-Vis	62.35	58.46	13.11	0.21	1.64	0.03
sun_sunf07a Sun-Sun M-DSP-Net-VDISP	60.71	56.11	13.11	0.22	1.64	0.03
sun_sunf08a Sun-Sun D-DSP-Net-VDISP	62.67	57.76	13.11	0.21	1.64	0.03

## Processing Rates (in Mbytes/second)

Network speed:	1.86
DSP-VIS speed:	0.24

Asynchronous sun\_sun (FDDI) configuration (Buffsize=256, SNM=None)

Test Case: Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun_sunf01a Sun-Sun Memory-Net-Memory	4.62	2.15	13.11	2.83	1.64	0.35
sun_sunf02a Sun-Sun Disk-Net-Memory	11.11	5.47	13.11	1.18	1.64	0.15
sun_sunf03a Sun-Sun Memory-Net-Disp	5.03	1.80	13.11	2.60	1.64	0.33
sun_sunf04a Sun-Sun Disk-Net-Disp	7.78	4.45	13.11	1.68	1.64	0.21
sun_sunf05a Sun-Sun Mem-DSP-Net-Vis	39.37	34.85	13.11	0.33	1.64	0.04
sun_sunf06a Sun-Sun Disk-DSP-Net-Vis	56.56	51.78	13.11	0.23	1.64	0.03
sun_sunf07a Sun-Sun M-DSP-Net-VDISP	38.98	34.55	13.11	0.34	1.64	0.04
sun_sunf08a Sun-Sun D-DSP-Net-VDISP	56.13	51.33	13.11	0.23	1.64	0.03

## Processing Rates (in Mbytes/second)

Network speed:	2.83
DSP-VIS speed:	0.38

Asynchronous sun\_sun (FDDI) configuration (Buffsize=256, SNM=None)

Test Case:	Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun_sun01b	Sun-Sun Memory-Net-Memory	9.04	3.22	13.11	1.45	1.64	0.18
sun_sun02b	Sun-Sun Disk-Net-Memory	13.79	6.95	13.11	0.95	1.64	0.12
sun_sun03b	Sun-Sun Memory-Net-Disp	10.55	3.93	13.11	1.24	1.64	0.16
sun_sun04b	Sun-Sun Disk-Net-Disp	16.67	7.73	13.11	0.79	1.64	0.10
sun_sun05b	Sun-Sun Mem-DSP-Net-Vis	97.31	87.10	13.11	0.13	1.64	0.02
sun_sun06b	Sun-Sun Disk-DSP-Net-Vis	95.74	85.28	13.11	0.14	1.64	0.02
sun_sun07b	Sun-Sun M-DSP-Net-VDisp	97.27	87.05	13.11	0.13	1.64	0.02
sun_sun08b	Sun-Sun D-DSP-Net-VDisp	95.83	85.28	13.11	0.14	1.64	0.02

Processing Rates (in Mbytes/second)

Network speed:	1.45
DSP-VIS speed:	0.15

**Asynchronous sun\_sun configuration (Buffsize=16K, SNM=None)**

Test Case: Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun_sun01b Sun-Sun Memory-Net-Memory	8.95	3.27	13.11	1.46	1.64	0.18
sun_sun02b Sun-Sun Disk-Net-Memory	13.92	7.08	13.11	0.94	1.64	0.12
sun_sun03b Sun-Sun Memory-Net-Disp	9.98	3.78	13.11	1.31	1.64	0.16
sun_sun04b Sun-Sun Disk-Net-Disp	15.54	7.42	13.11	0.84	1.64	0.11
sun_sun05b Sun-Sun Mem-DSP-Net-Vis	96.63	86.78	13.11	0.14	1.64	0.02
sun_sun06b Sun-Sun Disk-DSP-Net-Vis	96.03	85.18	13.11	0.14	1.64	0.02
sun_sun07b Sun-Sun M-DSP-Net-VDISP	97.32	86.73	13.11	0.13	1.64	0.02
sun_sun08b Sun-Sun D-DSP-Net-VDISP	95.84	85.05	13.11	0.14	1.64	0.02

## Processing Rates (in Mbytes/second)

Network speed:	1.46
DSP-VIS speed:	0.15

Asynchronous sun\_sun configuration (Buffsize=16K, SNM=None)

Test Case:	Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun_sun01b	Sun-Sun Memory-Net-Memory	8.33	3.55	13.11	1.57	1.64	0.20
sun_sun02b	Sun-Sun Disk-Net-Memory	13.43	6.72	13.11	0.98	1.64	0.12
sun_sun03b	Sun-Sun Memory-Net-Disp	8.13	3.13	13.11	1.61	1.64	0.20
sun_sun04b	Sun-Sun Disk-Net-Disp	14.94	7.02	13.11	0.88	1.64	0.11
sun_sun05b	Sun-Sun Mem-DSP-Net-Vis	75.07	64.08	13.11	0.17	1.64	0.02
sun_sun06b	Sun-Sun Disk-DSP-Net-Vis	92.54	82.00	13.11	0.14	1.64	0.02
sun_sun07b	Sun-Sun M-DSP-Net-VDisp	74.22	63.98	13.11	0.18	1.64	0.02
sun_sun08b	Sun-Sun D-DSP-Net-VDisp	92.92	81.96	13.11	0.14	1.64	0.02

## Processing Rates (in Mbytes/second)

Network speed:	1.57
DSP-VIS speed:	0.20

Asynchronous sun\_sun configuration (Buffsize=16K, SNM=None)



Test Case: Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun_sunf01b Sun-Sun Memory-Net-Memory	8.49	4.00	13.11	1.54	1.64	0.19
sun_sunf02b Sun-Sun Disk-Net-Memory	9.90	6.67	13.11	1.32	1.64	0.17
sun_sunf03b Sun-Sun Memory-Net-Disp	10.30	4.43	13.11	1.27	1.64	0.16
sun_sunf04b Sun-Sun Disk-Net-Disp	11.15	6.80	13.11	1.18	1.64	0.15
sun_sunf05b Sun-Sun Mem-DSP-Net-Vis	88.22	83.95	13.11	0.15	1.64	0.02
sun_sunf06b Sun-Sun Disk-DSP-Net-Vis	90.61	86.90	13.11	0.14	1.64	0.02
sun_sunf07b Sun-Sun M-DSP-Net-VDISP	88.59	83.40	13.11	0.15	1.64	0.02
sun_sunf08b Sun-Sun D-DSP-Net-VDISP	90.83	87.28	13.11	0.14	1.64	0.02

## Processing Rates (in Mbytes/second)

Network speed:	1.54
DSP-VIS speed:	0.16

Asynchronous sun\_sun (FDDI) configuration (Buffsize=16K, SNM=None)

Test Case: Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun_sunf01b	0.00	0.00	0.00	0.00	0.00	0.00
sun_sunf02b Sun-Sun Disk-Net-Memory	4.25	3.38	13.11	3.09	1.64	0.39
sun_sunf03b Sun-Sun Memory-Net-Disp	9.62	4.45	13.11	1.36	1.64	0.17
sun_sunf04b Sun-Sun Disk-Net-Disp	11.44	6.92	13.11	1.15	1.64	0.14
sun_sunf05b Sun-Sun Mem-DSP-Net-Vis	87.44	83.48	13.11	0.15	1.64	0.02
sun_sunf06b Sun-Sun Disk-DSP-Net-Vis	90.89	87.18	13.11	0.14	1.64	0.02
sun_sunf07b Sun-Sun M-DSP-Net-VDisp	88.21	83.31	13.11	0.15	1.64	0.02
sun_sunf08b Sun-Sun D-DSP-Net-VDisp	91.43	86.81	13.11	0.14	1.64	0.02

## Processing Rates (in Mbytes/second)

Network speed:	0.00
DSP-VIS speed:	0.00

Asynchronous sun\_sun (FDDI) configuration (Buffsize=16K, SNM=None)

Test Case: Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun_sunf01b Sun-Sun Memory-Net-Memory	7.32	4.52	13.11	1.79	1.64	0.22
sun_sunf02b Sun-Sun Disk-Net-Memory	11.43	8.20	13.11	1.15	1.64	0.14
sun_sunf03b Sun-Sun Memory-Net-Disp	10.82	5.18	13.11	1.21	1.64	0.15
sun_sunf04b Sun-Sun Disk-Net-Disp	12.49	7.92	13.11	1.05	1.64	0.13
sun_sunf05b Sun-Sun Mem-DSP-Net-Vis	69.85	65.73	13.11	0.19	1.64	0.02
sun_sunf06b Sun-Sun Disk-DSP-Net-Vis	83.39	78.53	13.11	0.16	1.64	0.02
sun_sunf07b Sun-Sun M-DSP-Net-VDISP	69.72	65.50	13.11	0.19	1.64	0.02
sun_sunf08b Sun-Sun D-DSP-Net-VDISP	82.83	78.56	13.11	0.16	1.64	0.02

## Processing Rates (in Mbytes/second)

Network speed:	1.79
DSP-VIS speed:	0.21

Asynchronous sun\_sun (FDDI) configuration (Buffsize=16K, SNM=None)

Test Case:	Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun_sun01c	Sun-Sun Memory-Net-Memory	21.39	7.33	12.58	0.59	1.57	0.07
sun_sun02c	Sun-Sun Disk-Net-Memory	18.91	9.22	12.58	0.67	1.57	0.08
sun_sun03c	Sun-Sun Memory-Net-Disp	22.43	7.50	12.58	0.56	1.57	0.07
sun_sun04c	Sun-Sun Disk-Net-Disp	23.90	8.95	12.58	0.53	1.57	0.07
sun_sun05c	Sun-Sun Mem-DSP-Net-Vis	101.31	91.73	12.58	0.12	1.57	0.02
sun_sun06c	Sun-Sun Disk-Net-Vis	99.39	89.86	12.58	0.13	1.57	0.02
sun_sun07c	Sun-Sun M-DSP-Net-VDISP	103.73	91.63	12.58	0.12	1.57	0.02
sun_sun08c	Sun-Sun D-DSP-Net-VDISP	101.98	89.98	12.58	0.12	1.57	0.02

## Processing Rates (in Mbytes/second)

Network speed:	0.59
DSP-VIS speed:	0.16

Asynchronous sun\_sun configuration (Buffsize=128K, SNM=None)

Test Case: Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun_sun01c Sun-Sun Memory-Net-Memory	15.58	6.40	12.58	0.81	1.57	0.10
sun_sun02c Sun-Sun Disk-Net-Memory	18.26	9.23	12.58	0.69	1.57	0.09
sun_sun03c Sun-Sun Memory-Net-Disp	17.18	6.53	12.58	0.73	1.57	0.09
sun_sun04c Sun-Sun Disk-Net-Disp	20.87	9.18	12.58	0.60	1.57	0.08
sun_sun05c Sun-Sun Mem-DSP-Net-Vis	101.09	91.73	12.58	0.12	1.57	0.02
sun_sun06c Sun-Sun Disk-Net-Vis	99.22	90.08	12.58	0.13	1.57	0.02
sun_sun07c Sun-Sun M-DSP-Net-VDISP	101.25	91.58	12.58	0.12	1.57	0.02
sun_sun08c Sun-Sun D-DSP-Net-VDISP	99.63	90.05	12.58	0.13	1.57	0.02

## Processing Rates (in Mbytes/second)

Network speed:	0.81
DSP-VIS speed:	0.15

Asynchronous sun\_sun configuration (Buffsize=128K, SNM=None)

Test Case:	Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun_sun01c	Sun-Sun Memory-Net-Memory	15.54	6.58	12.58	0.81	1.57	0.10
sun_sun02c	Sun-Sun Disk-Net-Memory	19.85	9.22	12.58	0.63	1.57	0.08
sun_sun03c	Sun-Sun Memory-Net-Disp	16.54	6.02	12.58	0.76	1.57	0.10
sun_sun04c	Sun-Sun Disk-Net-Disp	22.22	9.18	12.58	0.57	1.57	0.07
sun_sun05c	Sun-Sun Mem-DSP-Net-Vis	78.96	69.40	12.58	0.16	1.57	0.02
sun_sun06c	Sun-Sun Disk-Net-Vis	96.28	86.70	12.58	0.13	1.57	0.02
sun_sun07c	Sun-Sun M-DSP-Net-VDISP	78.89	69.51	12.58	0.16	1.57	0.02
sun_sun08c	Sun-Sun D-DSP-Net-VDISP	96.09	86.71	12.58	0.13	1.57	0.02

## Processing Rates (in Mbytes/second)

Network speed:	0.81
DSP-VIS speed:	0.20

Asynchronous sun\_sun configuration (Buffsize=128K, SNM=None)

Test Case: Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun_sunf01c Sun-Sun Memory-Net-Memory	10.96	6.57	12.58	1.15	1.57	0.14
sun_sunf02c Sun-Sun Disk-Net-Memory	11.84	8.33	12.58	1.06	1.57	0.13
sun_sunf03c Sun-Sun Memory-Net-Disp	11.46	6.10	12.58	1.10	1.57	0.14
sun_sunf04c Sun-Sun Disk-Net-Disp	14.33	7.88	12.58	0.88	1.57	0.11
sun_sunf05c Sun-Sun Mem-DSP-Net-Vis	92.03	88.05	12.58	0.14	1.57	0.02
sun_sunf06c Sun-Sun Disk-Net-Vis	96.41	92.76	12.58	0.13	1.57	0.02
sun_sunf07c Sun-Sun M-DSP-Net-VDisp	91.78	88.03	12.58	0.14	1.57	0.02
sun_sunf08c Sun-Sun D-DSP-Net-VDisp	96.30	92.71	12.58	0.13	1.57	0.02

## Processing Rates (in Mbytes/second)

Network speed:	1.15
DSP-VIS speed:	0.16

Asynchronous sun\_sun (FDDI) configuration (Bufsize=128K, SNM=None)

Test Case: Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun_sunf01c Sun-Sun Memory-Net-Memory	10.51	6.22	12.58	1.20	1.57	0.15
sun_sunf02c Sun-Sun Disk-Net-Memory	11.36	8.37	12.58	1.11	1.57	0.14
sun_sunf03c Sun-Sun Memory-Net-Disp	11.89	5.98	12.58	1.06	1.57	0.13
sun_sunf04c Sun-Sun Disk-Net-Disp	14.39	8.03	12.58	0.87	1.57	0.11
sun_sunf05c Sun-Sun Mem-DSP-Net-Vis	91.52	88.16	12.58	0.14	1.57	0.02
sun_sunf06c Sun-Sun Disk-Net-Vis	96.25	92.68	12.58	0.13	1.57	0.02
sun_sunf07c Sun-Sun M-DSP-Net-VDisp	91.51	88.11	12.58	0.14	1.57	0.02
sun_sunf08c Sun-Sun D-DSP-Net-VDisp	96.25	92.56	12.58	0.13	1.57	0.02

Processing Rates (in Mbytes/second)

-----  
 Network speed: 1.20  
 DSP-VIS speed: 0.16

**Asynchronous sun\_sun (FDDI) configuration (Bufsize=128K, SNM=None)**



Test Case: Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun_sunf01c Sun-Sun Memory-Net-Memory	14.02	6.35	12.58	0.90	1.57	0.11
sun_sunf02c Sun-Sun Disk-Net-Memory	12.78	8.25	12.58	0.98	1.57	0.12
sun_sunf03c Sun-Sun Memory-Net-Disp	13.45	5.80	12.58	0.94	1.57	0.12
sun_sunf04c Sun-Sun Disk-Net-Disp	15.35	8.22	12.58	0.82	1.57	0.10
sun_sunf05c Sun-Sun Mem-DSP-Net-Vis	74.02	70.85	12.58	0.17	1.57	0.02
sun_sunf06c Sun-Sun Disk-Net-Vis	87.09	83.71	12.58	0.14	1.57	0.02
sun_sunf07c Sun-Sun M-DSP-Net-VDisp	74.38	71.03	12.58	0.17	1.57	0.02
sun_sunf08c Sun-Sun D-DSP-Net-VDisp	87.24	83.90	12.58	0.14	1.57	0.02

## Processing Rates (in Mbytes/second)

Network speed:	0.90
DSP-VIS speed:	0.21

Asynchronous sun\_sun (FDDI) configuration (Buffsize=128K, SNM=None)

#### A.5

##### **CRAY-SUN NETWORKED TEST REPORTS**

The following test reports were used in preparing the spreadsheets for the Cray-Sun networked test results. The reports are listed in order of buffer size. These reports are for asynchronous processing. For comparison to synchronous results, refer to Appendix B.

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray_sun01a	Cray-Sun Memory-Net-Memory	6.49	3.70	13.11	2.02	1.64	0.25
cray_sun02a	Cray-Sun Disk-Net-Memory	10.92	8.75	13.11	1.20	1.64	0.15
cray_sun03a	Cray-Sun Memory-Net-Disp	6.09	3.75	13.11	2.15	1.64	0.27
cray_sun04a	Cray-Sun Disk-Net-Disp	11.38	8.77	13.11	1.15	1.64	0.14
cray_sun05a	Cray-Sun Mem-DSP-Net-Vis	17.27	13.61	13.11	0.76	1.64	0.09
cray_sun06a	Cray-Sun Disk-DSP-Net-Vis	22.51	16.59	13.11	0.58	1.64	0.07
cray_sun07a	Cray-Sun M-DSP-Net-VDISP	17.07	13.57	13.11	0.77	1.64	0.10
cray_sun08a	Cray-Sun D-DSP-Net-VDISP	22.87	16.56	13.11	0.57	1.64	0.07

Processing Rates (in Mbytes/second)

Network speed:	2.02
DSP-VIS speed:	1.22

**Asynch. cray\_sun configuration (Buffsize=256, SNM=None, CPUS=2)**

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray_sun01a	Cray-Sun Memory-Net-Memory	5.52	3.75	13.11	2.37	1.64	0.30
cray_sun02a	Cray-Sun Disk-Net-Memory	11.06	8.73	13.11	1.19	1.64	0.15
cray_sun03a	Cray-Sun Memory-Net-Disp	6.43	3.71	13.11	2.04	1.64	0.25
cray_sun04a	Cray-Sun Disk-Net-Disp	10.21	8.73	13.11	1.28	1.64	0.16
cray_sun05a	Cray-Sun Mem-DSP-Net-Vis	18.21	13.50	13.11	0.72	1.64	0.09
cray_sun06a	Cray-Sun Disk-DSP-Net-Vis	22.39	16.05	13.11	0.59	1.64	0.07
cray_sun07a	Cray-Sun M-DSP-Net-VDISP	17.36	13.49	13.11	0.75	1.64	0.09
cray_sun08a	Cray-Sun D-DSP-Net-VDISP	22.73	16.42	13.11	0.58	1.64	0.07

## Processing Rates (in Mbytes/second)

Network speed:	2.37
DSP-VIS speed:	1.03

Asynch. cray\_sun configuration (Buffsize=256, SNM=None, CPUS=2)

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray_sun01a	Cray-Sun Memory-Net-Memory	6.34	3.75	13.11	2.07	1.64	0.26
cray_sun02a	Cray-Sun Disk-Net-Memory	11.21	8.78	13.11	1.17	1.64	0.15
cray_sun03a	Cray-Sun Memory-Net-Disp	6.38	3.69	13.11	2.05	1.64	0.26
cray_sun04a	Cray-Sun Disk-Net-Disp	11.33	8.81	13.11	1.16	1.64	0.14
cray_sun05a	Cray-Sun Mem-DSP-Net-Vis	17.49	11.37	13.11	0.75	1.64	0.09
cray_sun06a	Cray-Sun Disk-DSP-Net-Vis	22.33	11.47	13.11	0.59	1.64	0.07
cray_sun07a	Cray-Sun M-DSP-Net-VDISP	17.12	12.08	13.11	0.77	1.64	0.10
cray_sun08a	Cray-Sun D-DSP-Net-VDISP	23.47	11.97	13.11	0.56	1.64	0.07

## Processing Rates (in Mbytes/second)

Network speed:	2.07
DSP-VIS speed:	1.18

Asynch. cray\_sun configuration (Bufsize=256, SNM=None, CPUS=2)

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray_sunf01a	Cray-Sun Memory-Net-Memory	7.15	5.56	13.11	1.83	1.64	0.23
cray_sunf02a	Cray-Sun Disk-Net-Memory	14.69	12.44	13.11	0.89	1.64	0.11
cray_sunf03a	Cray-Sun Memory-Net-Disp	6.52	4.07	13.11	2.01	1.64	0.25
cray_sunf04a	Cray-Sun Disk-Net-Disp	11.90	9.58	13.11	1.10	1.64	0.14
cray_sunf05a	Cray-Sun Mem-DSP-Net-Vis	16.96	13.72	13.11	0.77	1.64	0.10
cray_sunf06a	Cray-Sun Disk-DSP-Net-Vis	21.85	16.07	13.11	0.60	1.64	0.07
cray_sunf07a	Cray-Sun M-DSP-Net-VDISP	17.68	13.46	13.11	0.74	1.64	0.09
cray_sunf08a	Cray-Sun D-DSP-Net-VDISP	22.72	16.46	13.11	0.58	1.64	0.07

## Processing Rates (in Mbytes/second)

Network speed:	1.83
DSP-VIS speed:	1.34

Asynch. cray\_sun (FDDI) configuration (Buffsize=256, SNM=None, CPUS=2)

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray_sunf01a	Cray-Sun Memory-Net-Memory	8.10	5.59	13.11	1.62	1.64	0.20
cray_sunf02a	Cray-Sun Disk-Net-Memory	14.61	12.53	13.11	0.90	1.64	0.11
cray_sunf03a	Cray-Sun Memory-Net-Disp	6.08	4.07	13.11	2.16	1.64	0.27
cray_sunf04a	Cray-Sun Disk-Net-Disp	12.24	9.53	13.11	1.07	1.64	0.13
cray_sunf05a	Cray-Sun Mem-DSP-Net-Vis	17.44	13.55	13.11	0.75	1.64	0.09
cray_sunf06a	Cray-Sun Disk-DSP-Net-Vis	22.00	16.06	13.11	0.60	1.64	0.07
cray_sunf07a	Cray-Sun M-DSP-Net-VDISP	17.47	13.45	13.11	0.75	1.64	0.09
cray_sunf08a	Cray-Sun D-DSP-Net-VDISP	21.62	16.44	13.11	0.61	1.64	0.08

## Processing Rates (in Mbytes/second)

Network speed:	1.62
DSP-VIS speed:	1.40

Asynch. cray\_sun (FDDI) configuration (Buffsize=256, SNM=None, CPUS=2)

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray_sunf01a	Cray-Sun Memory-Net-Memory	8.81	5.55	13.11	1.49	1.64	0.19
cray_sunf02a	Cray-Sun Disk-Net-Memory	14.81	12.51	13.11	0.89	1.64	0.11
cray_sunf03a	Cray-Sun Memory-Net-Disp	6.48	4.08	13.11	2.02	1.64	0.25
cray_sunf04a	Cray-Sun Disk-Net-Disp	11.58	9.60	13.11	1.13	1.64	0.14
cray_sunf05a	Cray-Sun Mem-DSP-Net-Vis	17.63	12.21	13.11	0.74	1.64	0.09
cray_sunf06a	Cray-Sun Disk-DSP-Net-Vis	22.85	11.22	13.11	0.57	1.64	0.07
cray_sunf07a	Cray-Sun M-DSP-Net-VDISP	17.60	11.65	13.11	0.74	1.64	0.09
cray_sunf08a	Cray-Sun D-DSP-Net-VDISP	22.85	11.11	13.11	0.57	1.64	0.07

## Processing Rates (in Mbytes/second)

Network speed:	1.49
DSP-VIS speed:	1.49

**Asynch. cray\_sun (FDDI) configuration (Buffsize=256, SNM=None, CPUS=2)**



Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray_sun01b	Cray-Sun Memory-Net-Memory	4.29	0.62	13.11	3.05	1.64	0.38
cray_sun02b	Cray-Sun Disk-Net-Memory	4.32	1.47	13.11	3.04	1.64	0.38
cray_sun03b	Cray-Sun Memory-Net-Disp	4.88	0.65	13.11	2.68	1.64	0.34
cray_sun04b	Cray-Sun Disk-Net-Disp	4.55	0.77	13.11	2.88	1.64	0.36
cray_sun05b	Cray-Sun Mem-DSP-Net-Vis	16.12	4.74	13.11	0.81	1.64	0.10
cray_sun06b	Cray-Sun Disk-DSP-Net-Vis	19.69	4.51	13.11	0.67	1.64	0.08
cray_sun07b	Cray-Sun M-DSP-Net-VDISP	27.72	4.62	13.11	0.47	1.64	0.06
cray_sun08b	Cray-Sun D-DSP-Net-VDISP	29.05	4.83	13.11	0.45	1.64	0.06

## Processing Rates (in Mbytes/second)

Network speed:	3.05
DSP-VIS speed:	1.11

Asynch. cray\_sun configuration (Buffsize=16K, SNM=None, CPUS=2)

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray_sun01b	Cray-Sun Memory-Net-Memory	2.62	0.52	13.11	5.00	1.64	0.62
cray_sun02b	Cray-Sun Disk-Net-Memory	4.91	1.44	13.11	2.67	1.64	0.33
cray_sun03b	Cray-Sun Memory-Net-Disp	3.53	0.51	13.11	3.71	1.64	0.46
cray_sun04b	Cray-Sun Disk-Net-Disp	5.43	1.19	13.11	2.41	1.64	0.30
cray_sun05b	Cray-Sun Mem-DSP-Net-Vis	20.46	5.91	13.11	0.64	1.64	0.08
cray_sun06b	Cray-Sun Disk-DSP-Net-Vis	17.46	4.32	13.11	0.75	1.64	0.09
cray_sun07b	Cray-Sun M-DSP-Net-VDISP	22.89	5.05	13.11	0.57	1.64	0.07
cray_sun08b	Cray-Sun D-DSP-Net-VDISP	26.07	4.69	13.11	0.50	1.64	0.06

## Processing Rates (in Mbytes/second)

Network speed:	5.00
DSP-VIS speed:	0.73

Asynch. cray\_sun configuration (Buffsize=16K, SNM=None, CPUS=2)

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray_sun01b	Cray-Sun Memory-Net-Memory	3.20	0.39	13.11	4.09	1.64	0.51
cray_sun02b	Cray-Sun Disk-Net-Memory	5.66	1.68	13.11	2.32	1.64	0.29
cray_sun03b	Cray-Sun Memory-Net-Disp	4.70	0.76	13.11	2.79	1.64	0.35
cray_sun04b	Cray-Sun Disk-Net-Disp	5.31	1.11	13.11	2.47	1.64	0.31
cray_sun05b	Cray-Sun Mem-DSP-Net-Vis	22.73	4.68	13.11	0.58	1.64	0.07
cray_sun06b	Cray-Sun Disk-DSP-Net-Vis	23.60	6.60	13.11	0.56	1.64	0.07
cray_sun07b	Cray-Sun M-DSP-Net-VDISP	25.62	4.28	13.11	0.51	1.64	0.06
cray_sun08b	Cray-Sun D-DSP-Net-VDISP	24.17	6.47	13.11	0.54	1.64	0.07

## Processing Rates (in Mbytes/second)

Network speed:	4.09
DSP-VIS speed:	0.67

Asynch. cray\_sun configuration (Buffsize=16K, SNM=None, CPUS=2)

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray_sunf01b	Cray-Sun Memory-Net-Memory	3.15	0.56	13.11	4.15	1.64	0.52
cray_sunf02b	Cray-Sun Disk-Net-Memory	2.65	0.77	13.11	4.95	1.64	0.62
cray_sunf03b	Cray-Sun Memory-Net-Disp	3.47	0.41	13.11	3.78	1.64	0.47
cray_sunf04b	Cray-Sun Disk-Net-Disp	6.65	1.25	13.11	1.97	1.64	0.25
cray_sunf05b	Cray-Sun Mem-DSP-Net-Vis	21.99	4.25	13.11	0.60	1.64	0.07
cray_sunf06b	Cray-Sun Disk-DSP-Net-Vis	22.53	4.56	13.11	0.58	1.64	0.07
cray_sunf07b	Cray-Sun M-DSP-Net-VDISP	30.20	4.28	13.11	0.43	1.64	0.05
cray_sunf08b	Cray-Sun D-DSP-Net-VDISP	32.21	5.33	13.11	0.41	1.64	0.05

Processing Rates (in Mbytes/second)

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 Network speed: 4.15  
 DSP-VIS speed: 0.70

**Asynch. cray\_sun (FDDI) configuration (Buffsize=16K, SNM=None, CPUS=2)**

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray_sunf01b	Cray-Sun Memory-Net-Memory	2.59	0.53	13.11	5.05	1.64	0.63
cray_sunf02b	Cray-Sun Disk-Net-Memory	3.35	0.88	13.11	3.91	1.64	0.49
cray_sunf03b	Cray-Sun Memory-Net-Disp	3.17	0.49	13.11	4.13	1.64	0.52
cray_sunf04b	Cray-Sun Disk-Net-Disp	6.58	1.08	13.11	1.99	1.64	0.25
cray_sunf05b	Cray-Sun Mem-DSP-Net-Vis	22.64	5.10	13.11	0.58	1.64	0.07
cray_sunf06b	Cray-Sun Disk-DSP-Net-Vis	23.04	4.30	13.11	0.57	1.64	0.07
cray_sunf07b	Cray-Sun M-DSP-Net-VDISP	31.93	4.28	13.11	0.41	1.64	0.05
cray_sunf08b	Cray-Sun D-DSP-Net-VDISP	32.71	6.21	13.11	0.40	1.64	0.05

## Processing Rates (in Mbytes/second)

Network speed:	5.05
DSP-VIS speed:	0.65

Asynch. cray\_sun (FDDI) configuration (Buffsize=16K, SNM=None, CPUS=2)

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray_sunf01b	Cray-Sun Memory-Net-Memory	4.39	0.62	13.11	2.98	1.64	0.37
cray_sunf02b	Cray-Sun Disk-Net-Memory	3.78	1.22	13.11	3.46	1.64	0.43
cray_sunf03b	Cray-Sun Memory-Net-Disp	4.21	0.56	13.11	3.11	1.64	0.39
cray_sunf04b	Cray-Sun Disk-Net-Disp	5.86	1.20	13.11	2.24	1.64	0.28
cray_sunf05b	Cray-Sun Mem-DSP-Net-Vis	22.95	4.70	13.11	0.57	1.64	0.07
cray_sunf06b	Cray-Sun Disk-DSP-Net-Vis	22.37	4.60	13.11	0.59	1.64	0.07
cray_sunf07b	Cray-Sun M-DSP-Net-VDisp	30.75	4.19	13.11	0.43	1.64	0.05
cray_sunf08b	Cray-Sun D-DSP-Net-VDisp	31.94	6.04	13.11	0.41	1.64	0.05

Processing Rates (in Mbytes/second)

-----  
 Network speed: 2.98  
 DSP-VIS speed: 0.71

**Asynch. cray\_sun (FDDI) configuration (Bufsize=16K, SNM=None, CPUS=2)**

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray_sun01c	Cray-Sun Memory-Net-Memory	5.01	1.12	12.58	2.51	1.57	0.31
cray_sun02c	Cray-Sun Disk-Net-Memory	13.30	4.18	12.58	0.95	1.57	0.12
cray_sun03c	Cray-Sun Memory-Net-Disp	10.78	1.98	12.58	1.17	1.57	0.15
cray_sun04c	Cray-Sun Disk-Net-Disp	10.74	2.21	12.58	1.17	1.57	0.15
cray_sun05c	Cray-Sun Mem-DSP-Net-Vis	24.22	3.26	12.58	0.52	1.57	0.06
cray_sun06c	Cray-Sun Disk-DSP-Net-Vis	24.61	5.63	12.58	0.51	1.57	0.06
cray_sun07c	Cray-Sun M-DSP-Net-VDISP	26.00	6.54	12.58	0.48	1.57	0.06
cray_sun08c	Cray-Sun D-DSP-Net-VDISP	27.01	8.98	12.58	0.47	1.57	0.06

## Processing Rates (in Mbytes/second)

Network speed:	2.51
DSP-VIS speed:	0.65

Asynch. cray\_sun configuration (Buffsize=128K, SNM=None, CPUS=2)

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray_sun01c	Cray-Sun Memory-Net-Memory	7.99	1.15	12.58	1.57	1.57	0.20
cray_sun02c	Cray-Sun Disk-Net-Memory	12.05	3.77	12.58	1.04	1.57	0.13
cray_sun03c	Cray-Sun Memory-Net-Disp	7.84	1.13	12.58	1.60	1.57	0.20
cray_sun04c	Cray-Sun Disk-Net-Disp	17.22	3.93	12.58	0.73	1.57	0.09
cray_sun05c	Cray-Sun Mem-DSP-Net-Vis	26.91	7.58	12.58	0.47	1.57	0.06
cray_sun06c	Cray-Sun Disk-DSP-Net-Vis	24.21	8.78	12.58	0.52	1.57	0.06
cray_sun07c	Cray-Sun M-DSP-Net-VDisp	26.29	9.11	12.58	0.48	1.57	0.06
cray_sun08c	Cray-Sun D-DSP-Net-VDisp	26.39	3.52	12.58	0.48	1.57	0.06

## Processing Rates (in Mbytes/second)

Network speed:	1.57
DSP-VIS speed:	0.66

Asynch. cray\_sun configuration (Buffsize=128K, SNM=None, CPUS=2)



Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray_sun01c	Cray-Sun Memory-Net-Memory	5.48	1.14	12.58	2.29	1.57	0.29
cray_sun02c	Cray-Sun Disk-Net-Memory	8.46	2.39	12.58	1.49	1.57	0.19
cray_sun03c	Cray-Sun Memory-Net-Disp	7.49	1.15	12.58	1.68	1.57	0.21
cray_sun04c	Cray-Sun Disk-Net-Disp	10.99	2.25	12.58	1.15	1.57	0.14
cray_sun05c	Cray-Sun Mem-DSP-Net-Vis	25.07	6.07	12.58	0.50	1.57	0.06
cray_sun06c	Cray-Sun Disk-DSP-Net-Vis	24.38	3.59	12.58	0.52	1.57	0.06
cray_sun07c	Cray-Sun M-DSP-Net-VDisp	27.22	4.06	12.58	0.46	1.57	0.06
cray_sun08c	Cray-Sun D-DSP-Net-VDisp	25.38	7.20	12.58	0.50	1.57	0.06

## Processing Rates (in Mbytes/second)

Network speed:	2.29
DSP-VIS speed:	0.64

Asynch. cray\_sun configuration (Buffsize=128K, SNM=None, CPUS=2)

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray_sunf01c	Cray-Sun Memory-Net-Memory	5.09	0.95	12.58	2.47	1.57	0.31
cray_sunf02c	Cray-Sun Disk-Net-Memory	8.41	2.15	12.58	1.50	1.57	0.19
cray_sunf03c	Cray-Sun Memory-Net-Disp	7.45	0.93	12.58	1.69	1.57	0.21
cray_sunf04c	Cray-Sun Disk-Net-Disp	10.82	1.61	12.58	1.16	1.57	0.15
cray_sunf05c	Cray-Sun Mem-DSP-Net-Vis	14.64	3.91	12.58	0.86	1.57	0.11
cray_sunf06c	Cray-Sun Disk-DSP-Net-Vis	14.66	3.85	12.58	0.86	1.57	0.11
cray_sunf07c	Cray-Sun M-DSP-Net-VDisp	15.62	4.83	12.58	0.81	1.57	0.10
cray_sunf08c	Cray-Sun D-DSP-Net-VDisp	15.48	3.87	12.58	0.81	1.57	0.10

## Processing Rates (in Mbytes/second)

Network speed:	2.47
DSP-VIS speed:	1.32

Asynch. cray\_sun (FDDI) configuration (Buffsize=128K, SNM=None, CPUS=2)

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray_sunf01c	Cray-Sun Memory-Net-Memory	6.79	1.29	12.58	1.85	1.57	0.23
cray_sunf02c	Cray-Sun Disk-Net-Memory	7.89	2.31	12.58	1.59	1.57	0.20
cray_sunf03c	Cray-Sun Memory-Net-Disp	9.18	1.27	12.58	1.37	1.57	0.17
cray_sunf04c	Cray-Sun Disk-Net-Disp	9.95	1.60	12.58	1.26	1.57	0.16
cray_sunf05c	Cray-Sun Mem-DSP-Net-Vis	14.62	4.14	12.58	0.86	1.57	0.11
cray_sunf06c	Cray-Sun Disk-DSP-Net-Vis	14.56	2.75	12.58	0.86	1.57	0.11
cray_sunf07c	Cray-Sun M-DSP-Net-VDISP	15.92	5.64	12.58	0.79	1.57	0.10
cray_sunf08c	Cray-Sun D-DSP-Net-VDISP	17.14	5.65	12.58	0.73	1.57	0.09

## Processing Rates (in Mbytes/second)

Network speed:	1.85
DSP-VIS speed:	1.61

Asynch. cray\_sun (FDDI) configuration (Buffsize=128K, SNM=None, CPUS=2)

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray_sunf01c	Cray-Sun Memory-Net-Memory	6.19	1.12	12.58	2.03	1.57	0.25
cray_sunf02c	Cray-Sun Disk-Net-Memory	4.57	0.91	12.58	2.76	1.57	0.34
cray_sunf03c	Cray-Sun Memory-Net-Disp	8.84	1.11	12.58	1.42	1.57	0.18
cray_sunf04c	Cray-Sun Disk-Net-Disp	13.15	2.27	12.58	0.96	1.57	0.12
cray_sunf05c	Cray-Sun Mem-DSP-Net-Vis	16.60	3.44	12.58	0.76	1.57	0.09
cray_sunf06c	Cray-Sun Disk-DSP-Net-Vis	14.99	5.02	12.58	0.84	1.57	0.10
cray_sunf07c	Cray-Sun M-DSP-Net-VDisp	17.13	3.22	12.58	0.73	1.57	0.09
cray_sunf08c	Cray-Sun D-DSP-Net-VDisp	16.44	6.03	12.58	0.77	1.57	0.10

## Processing Rates (in Mbytes/second)

Network speed:	2.03
DSP-VIS speed:	1.21

Asynch. cray\_sun (FDDI) configuration (Buffsize=128K, SNM=None, CPUS=2)

#### A.6

#### CONVEX-SUN NETWORKED TEST REPORTS

The following test reports were used in preparing the spreadsheets for the Convex-Sun networked test results. The reports are listed in order of buffer size. These reports are for asynchronous processing. For comparison to synchronous results, refer to Appendix B.

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cvx_sun01a	Cvx-Sun Memory-Net-Memory	34.67	3.47	13.11	0.38	1.64	0.05
cvx_sun02a	Cvx-Sun Disk-Net-Memory	91.49	8.08	13.11	0.14	1.64	0.02
cvx_sun03a	Cvx-Sun Memory-Net-Disp	28.80	3.08	13.11	0.46	1.64	0.06
cvx_sun04a	Cvx-Sun Disk-Net-Disp	75.21	6.92	13.11	0.17	1.64	0.02
cvx_sun05a	Cvx-Sun Mem-DSP-Net-Vis	90.35	8.02	13.11	0.15	1.64	0.02
cvx_sun06a	Cvx-Sun Disk-DSP-Net-Vis	129.94	11.80	13.11	0.10	1.64	0.01
cvx_sun07a	Cvx-Sun M-DSP-Net-VDISP	91.49	8.00	13.11	0.14	1.64	0.02
cvx_sun08a	Cvx-Sun D-DSP-Net-VDISP	127.13	11.58	13.11	0.10	1.64	0.01

## Processing Rates (in Mbytes/second)

Network speed:	0.38
DSP-VIS speed:	0.24

**Asynch. cvx\_sun configuration (Buffsize=256, SNM=None)**

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cvx_sun01a	Cvx-Sun Memory-Net-Memory	8.23	3.33	13.11	1.59	1.64	0.20
cvx_sun02a	Cvx-Sun Disk-Net-Memory	16.76	7.70	13.11	0.78	1.64	0.10
cvx_sun03a	Cvx-Sun Memory-Net-Disp	8.98	2.92	13.11	1.46	1.64	0.18
cvx_sun04a	Cvx-Sun Disk-Net-Disp	15.24	6.35	13.11	0.86	1.64	0.11
cvx_sun05a	Cvx-Sun Mem-DSP-Net-Vis	16.08	7.72	13.11	0.82	1.64	0.10
cvx_sun06a	Cvx-Sun Disk-DSP-Net-Vis	23.34	10.95	13.11	0.56	1.64	0.07
cvx_sun07a	Cvx-Sun M-DSP-Net-VDisp	16.18	7.62	13.11	0.81	1.64	0.10
cvx_sun08a	Cvx-Sun D-DSP-Net-VDisp	23.47	10.77	13.11	0.56	1.64	0.07

## Processing Rates (in Mbytes/second)

Network speed:	1.59
DSP-VIS speed:	1.67

**Asynch. cvx\_sun configuration (Buffsize=256, SNM=None)**

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cvx_sunf01a	Cvx-Sun Memory-Net-Memory	7.67	0.00	13.11	1.71	1.64	0.21
cvx_sunf02a	Cvx-Sun Disk-Net-Memory	12.89	0.00	13.11	1.02	1.64	0.13
cvx_sunf03a	Cvx-Sun Memory-Net-Disp	5.89	0.00	13.11	2.22	1.64	0.28
cvx_sunf04a	Cvx-Sun Disk-Net-Disp	12.49	0.00	13.11	1.05	1.64	0.13
cvx_sunf05a	Cvx-Sun Mem-DSP-Net-Vis	18.28	0.00	13.11	0.72	1.64	0.09
cvx_sunf06a	Cvx-Sun Disk-DSP-Net-Vis	21.43	0.00	13.11	0.61	1.64	0.08
cvx_sunf07a	Cvx-Sun M-DSP-Net-VDISP	18.02	0.00	13.11	0.73	1.64	0.09
cvx_sunf08a	Cvx-Sun D-DSP-Net-VDISP	21.79	0.00	13.11	0.60	1.64	0.08

## Processing Rates (in Mbytes/second)

Network speed:	0.00
DSP-VIS speed:	0.00

Asynch. cvx\_sun (FDDI) configuration (Bufsize=256, SNM=None, ~~CPU8=4~~)

Defaulted to 2 CPUs



Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cvx_sunf01a	Cvx-Sun Memory-Net-Memory	10.43	5.67	13.11	1.26	1.64	0.16
cvx_sunf02a	Cvx-Sun Disk-Net-Memory	21.13	11.37	13.11	0.62	1.64	0.08
cvx_sunf03a	Cvx-Sun Memory-Net-Disp	8.89	4.48	13.11	1.47	1.64	0.18
cvx_sunf04a	Cvx-Sun Disk-Net-Disp	16.62	8.63	13.11	0.79	1.64	0.10
cvx_sunf05a	Cvx-Sun Mem-DSP-Net-Vis	13.72	8.72	13.11	0.96	1.64	0.12
cvx_sunf06a	Cvx-Sun Disk-DSP-Net-Vis	17.65	11.48	13.11	0.74	1.64	0.09
cvx_sunf07a	Cvx-Sun M-DSP-Net-VDisp	12.23	8.12	13.11	1.07	1.64	0.13
cvx_sunf08a	Cvx-Sun D-DSP-Net-VDisp	15.79	11.33	13.11	0.83	1.64	0.10

## Processing Rates (in Mbytes/second)

Network speed:	1.26
DSP-VIS speed:	3.98

**Asynch. cvx\_sun (FDDI) configuration (Buffsize=256, SNM=None)**

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cvx_sunf01a	Cvx-Sun Memory-Net-Memory	8.07	3.47	13.11	1.62	1.64	0.20
cvx_sunf02a	Cvx-Sun Disk-Net-Memory	18.70	8.18	13.11	0.70	1.64	0.09
cvx_sunf03a	Cvx-Sun Memory-Net-Disp	6.87	2.93	13.11	1.91	1.64	0.24
cvx_sunf04a	Cvx-Sun Disk-Net-Disp	15.89	6.43	13.11	0.82	1.64	0.10
cvx_sunf05a	Cvx-Sun Mem-DSP-Net-Vis	12.68	7.72	13.11	1.03	1.64	0.13
cvx_sunf06a	Cvx-Sun Disk-DSP-Net-Vis	23.26	10.92	13.11	0.56	1.64	0.07
cvx_sunf07a	Cvx-Sun M-DSP-Net-VDISP	17.13	7.62	13.11	0.77	1.64	0.10
cvx_sunf08a	Cvx-Sun D-DSP-Net-VDISP	24.47	10.77	13.11	0.54	1.64	0.07

## Processing Rates (in Mbytes/second)

Network speed:	1.62
DSP-VIS speed:	2.84

**Asynch. cvx\_sun (FDDI) configuration (Buffsize=256, SNM=None)**

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cvx_sun01b	Cvx-Sun Memory-Net-Memory	4.68	0.30	13.11	2.80	1.64	0.35
cvx_sun02b	Cvx-Sun Disk-Net-Memory	5.62	0.48	13.11	2.33	1.64	0.29
cvx_sun03b	Cvx-Sun Memory-Net-Disp	4.31	0.33	13.11	3.04	1.64	0.38
cvx_sun04b	Cvx-Sun Disk-Net-Disp	5.30	0.48	13.11	2.47	1.64	0.31
cvx_sun05b	Cvx-Sun Mem-DSP-Net-Vis	89.93	8.02	13.11	0.15	1.64	0.02
cvx_sun06b	Cvx-Sun Disk-DSP-Net-Vis	96.11	8.78	13.11	0.14	1.64	0.02
cvx_sun07b	Cvx-Sun M-DSP-Net-VDISP	90.26	8.05	13.11	0.15	1.64	0.02
cvx_sun08b	Cvx-Sun D-DSP-Net-VDISP	95.16	8.67	13.11	0.14	1.64	0.02

## Processing Rates (in Mbytes/second)

Network speed:	2.80
DSP-VIS speed:	0.15

**Asynch. cvx\_sun configuration (Buffsize=16K, SNM=None)**

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cvx_sun01b	Cvx-Sun Memory-Net-Memory	4.26	0.32	13.11	3.08	1.64	0.38
cvx_sun02b	Cvx-Sun Disk-Net-Memory	4.32	0.48	13.11	3.04	1.64	0.38
cvx_sun03b	Cvx-Sun Memory-Net-Disp	4.20	0.22	13.11	3.12	1.64	0.39
cvx_sun04b	Cvx-Sun Disk-Net-Disp	4.27	0.47	13.11	3.07	1.64	0.38
cvx_sun05b	Cvx-Sun Mem-DSP-Net-Vis	14.36	5.75	13.11	0.91	1.64	0.11
cvx_sun06b	Cvx-Sun Disk-DSP-Net-Vis	17.18	6.15	13.11	0.76	1.64	0.10
cvx_sun07b	Cvx-Sun M-DSP-Net-VDISP	15.09	5.52	13.11	0.87	1.64	0.11
cvx_sun08b	Cvx-Sun D-DSP-Net-VDISP	22.39	6.37	13.11	0.59	1.64	0.07

## Processing Rates (in Mbytes/second)

Network speed:	3.08
DSP-VIS speed:	1.30

Asynch. cvx\_sun configuration (Buffsize=16K, SNM=None)

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Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cvx_sunf01b	Cvx-Sun Memory-Net-Memory	4.25	0.00	13.11	3.09	1.64	0.39
cvx_sunf02b	Cvx-Sun Disk-Net-Memory	6.05	0.00	13.11	2.17	1.64	0.27
cvx_sunf03b	Cvx-Sun Memory-Net-Disp	6.04	0.00	13.11	2.17	1.64	0.27
cvx_sunf04b	Cvx-Sun Disk-Net-Disp	6.50	0.00	13.11	2.02	1.64	0.25
cvx_sunf05b	Cvx-Sun Mem-DSP-Net-Vis	28.34	0.00	13.11	0.46	1.64	0.06
cvx_sunf06b		0.00	0.00	0.00	0.00	0.00	0.00
cvx_sunf07b	Cvx-Sun M-DSP-Net-VDisp	34.56	0.00	13.11	0.38	1.64	0.05
cvx_sunf08b	Cvx-Sun D-DSP-Net-VDisp	34.60	0.00	13.11	0.38	1.64	0.05

## Processing Rates (in Mbytes/second)

Network speed: 0.00  
DSP-VIS speed: 0.00

Asynch. cvx\_sun (FDDI) configuration (Buffsize=16K, SNM=None, CPUs=4)

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cvx_sunf01b	Cvx-Sun Memory-Net-Memory	3.14	0.48	13.11	4.18	1.64	0.52
cvx_sunf02b	Cvx-Sun Disk-Net-Memory	6.32	1.13	13.11	2.07	1.64	0.26
cvx_sunf03b	Cvx-Sun Memory-Net-Disp	4.78	0.48	13.11	2.74	1.64	0.34
cvx_sunf04b	Cvx-Sun Disk-Net-Disp	6.62	0.98	13.11	1.98	1.64	0.25
cvx_sunf05b	Cvx-Sun Mem-DSP-Net-Vis	24.26	8.27	13.11	0.54	1.64	0.07
cvx_sunf06b	Cvx-Sun Disk-DSP-Net-Vis	24.07	8.25	13.11	0.54	1.64	0.07
cvx_sunf07b	Cvx-Sun M-DSP-Net-VDisp	34.05	7.87	13.11	0.38	1.64	0.05
cvx_sunf08b	Cvx-Sun D-DSP-Net-VDisp	31.16	8.05	13.11	0.42	1.64	0.05

## Processing Rates (in Mbytes/second)

Network speed:	4.18
DSP-VIS speed:	0.62

**Asynch. cvx\_sun (FDDI) configuration (Buffsize=16K, SNM=None)**

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cvx_sunf01b	Cvx-Sun Memory-Net-Memory	6.26	0.58	13.11	2.09	1.64	0.26
cvx_sunf02b	Cvx-Sun Disk-Net-Memory	7.64	1.37	13.11	1.71	1.64	0.21
cvx_sunf03b	Cvx-Sun Memory-Net-Disp	6.98	0.65	13.11	1.88	1.64	0.23
cvx_sunf04b	Cvx-Sun Disk-Net-Disp	8.90	1.38	13.11	1.47	1.64	0.18
cvx_sunf05b	Cvx-Sun Mem-DSP-Net-Vis	20.77	7.82	13.11	0.63	1.64	0.08
cvx_sunf06b	Cvx-Sun Disk-DSP-Net-Vis	24.58	7.93	13.11	0.53	1.64	0.07
cvx_sunf07b	Cvx-Sun M-DSP-Net-VDisp	34.38	7.67	13.11	0.38	1.64	0.05
cvx_sunf08b	Cvx-Sun D-DSP-Net-VDisp	35.02	7.78	13.11	0.37	1.64	0.05

## Processing Rates (in Mbytes/second)

Network speed:	2.09
DSP-VIS speed:	0.90

**Asynch. cvx\_sun (FDDI) configuration (Buffsize=16K, SNM=None)**

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cvx_sun01c	Cvx-Sun Memory-Net-Memory	5.50	0.97	12.58	2.29	1.57	0.29
cvx_sun02c	Cvx-Sun Disk-Net-Memory	35.55	3.63	12.58	0.35	1.57	0.04
cvx_sun03c	Cvx-Sun Memory-Net-Disp	7.53	0.98	12.58	1.67	1.57	0.21
cvx_sun04c	Cvx-Sun Disk-Net-Disp	10.96	1.42	12.58	1.15	1.57	0.14
cvx_sun05c	Cvx-Sun Mem-DSP-Net-Vis	128.99	10.07	12.58	0.10	1.57	0.01
cvx_sun06c	Cvx-Sun Disk-DSP-Net-Vis	130.36	10.13	12.58	0.10	1.57	0.01
cvx_sun07c	Cvx-Sun M-DSP-Net-VDisp	125.58	10.00	12.58	0.10	1.57	0.01
cvx_sun08c	Cvx-Sun D-DSP-Net-VDisp	123.42	10.05	12.58	0.10	1.57	0.01

## Processing Rates (in Mbytes/second)

Network speed:	2.29
DSP-VIS speed:	0.10

**Asynch. cvx\_sun configuration (Buffsize=128K, SNM=None)**



Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cvx_sun01c	Cvx-Sun Memory-Net-Memory	7.93	0.97	12.58	1.59	1.57	0.20
cvx_sun02c	Cvx-Sun Disk-Net-Memory	11.81	1.85	12.58	1.07	1.57	0.13
cvx_sun03c	Cvx-Sun Memory-Net-Disp	12.37	1.38	12.58	1.02	1.57	0.13
cvx_sun04c	Cvx-Sun Disk-Net-Disp	15.70	2.25	12.58	0.80	1.57	0.10
cvx_sun05c	Cvx-Sun Mem-DSP-Net-Vis	28.85	9.85	12.58	0.44	1.57	0.05
cvx_sun06c	Cvx-Sun Disk-DSP-Net-Vis	29.66	9.85	12.58	0.42	1.57	0.05
cvx_sun07c	Cvx-Sun M-DSP-Net-VDISP	28.95	9.88	12.58	0.43	1.57	0.05
cvx_sun08c	Cvx-Sun D-DSP-Net-VDISP	29.84	9.83	12.58	0.42	1.57	0.05

## Processing Rates (in Mbytes/second)

Network speed:	1.59
DSP-VIS speed:	0.60

Asynch. cvx\_sun configuration (Buffsize=128K, SNM=None)

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cvx_sunf01c	Cvx-Sun Memory-Net-Memory	5.50	0.00	12.58	2.29	1.57	0.29
cvx_sunf02c	Cvx-Sun Disk-Net-Memory	11.38	0.00	12.58	1.11	1.57	0.14
cvx_sunf03c	Cvx-Sun Memory-Net-Disp	9.29	0.00	12.58	1.35	1.57	0.17
cvx_sunf04c	Cvx-Sun Disk-Net-Disp	13.66	0.00	12.58	0.92	1.57	0.12
cvx_sunf05c	Cvx-Sun Mem-DSP-Net-Vis	30.22	0.00	12.58	0.42	1.57	0.05
cvx_sunf06c	Cvx-Sun Disk-DSP-Net-Vis	30.78	0.00	12.58	0.41	1.57	0.05
cvx_sunf07c	Cvx-Sun M-DSP-Net-VDISP	21.54	0.00	12.58	0.58	1.57	0.07
cvx_sunf08c	Cvx-Sun D-DSP-Net-VDISP	21.25	0.00	12.58	0.59	1.57	0.07

## Processing Rates (in Mbytes/second)

Network speed:	2.29
DSP-VIS speed:	0.51

Asynch. cvx\_sun (FDDI) configuration (Buffsize=128K, SNM=None, ~~CPUS=4~~)

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cvx_sunf01c	Cvx-Sun Memory-Net-Memory	8.41	1.78	12.58	1.50	1.57	0.19
cvx_sunf02c	Cvx-Sun Disk-Net-Memory	12.41	3.60	12.58	1.01	1.57	0.13
cvx_sunf03c	Cvx-Sun Memory-Net-Disp	11.15	2.07	12.58	1.13	1.57	0.14
cvx_sunf04c	Cvx-Sun Disk-Net-Disp	13.16	2.67	12.58	0.96	1.57	0.12
cvx_sunf05c	Cvx-Sun Mem-DSP-Net-Vis	15.77	8.30	12.58	0.80	1.57	0.10
cvx_sunf06c	Cvx-Sun Disk-DSP-Net-Vis	14.61	8.20	12.58	0.86	1.57	0.11
cvx_sunf07c	Cvx-Sun M-DSP-Net-VDISP	15.81	8.23	12.58	0.80	1.57	0.10
cvx_sunf08c	Cvx-Sun D-DSP-Net-VDISP	68.50	8.25	12.58	0.18	1.57	0.02

## Processing Rates (in Mbytes/second)

Network speed:	1.50
DSP-VIS speed:•	1.71

Asynch. cvx\_sun (FDDI) configuration (Buffsize=128K, SNM=None)

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cvx_sunf01c	Cvx-Sun Memory-Net-Memory	9.83	2.40	12.58	1.28	1.57	0.16
cvx_sunf02c	Cvx-Sun Disk-Net-Memory	12.08	3.58	12.58	1.04	1.57	0.13
cvx_sunf03c	Cvx-Sun Memory-Net-Disp	11.34	2.07	12.58	1.11	1.57	0.14
cvx_sunf04c	Cvx-Sun Disk-Net-Disp	14.78	3.23	12.58	0.85	1.57	0.11
cvx_sunf05c	Cvx-Sun Mem-DSP-Net-Vis	17.38	8.12	12.58	0.72	1.57	0.09
cvx_sunf06c	Cvx-Sun Disk-DSP-Net-Vis	16.03	8.10	12.58	0.79	1.57	0.10
cvx_sunf07c	Cvx-Sun M-DSP-Net-VDisp	18.27	8.12	12.58	0.69	1.57	0.09
cvx_sunf08c	Cvx-Sun D-DSP-Net-VDisp	17.42	8.08	12.58	0.72	1.57	0.09

## Processing Rates (in Mbytes/second)

Network speed:	1.28
DSP-VIS speed:	1.67

**Asynch. cvx\_sun (FDDI) configuration (Buffsize=128K, SNM=None)**

**APPENDIX B**

**SYNCHRONOUS TEST RESULTS  
AND  
DISK READ RATES**

**B.1**

**SUN-SUN NETWORKED TEST RESULTS**

The following test reports were run using synchronous processing. These results may be used for comparison to the asynchronous results listed in Appendix A. The reports are listed in order of buffer size.

Test Case:	Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun_sun01a	Sun-Sun Memory-Net-Memory	48.33	8.87	13.11	0.27	1.64	0.03
sun_sun02a	Sun-Sun Disk-Net-Memory	47.45	12.20	13.11	0.28	1.64	0.03
sun_sun03a	Sun-Sun Memory-Net-Disp	141.12	9.03	13.11	0.09	1.64	0.01
sun_sun04a	Sun-Sun Disk-Net-Disp	138.86	12.48	13.11	0.09	1.64	0.01
sun_sun05a	Sun-Sun Mem-DSP-Net-Vis	589.36	46.13	13.11	0.02	1.64	0.00
sun_sun06a	Sun-Sun Disk-DSP-Net-Vis	1134.66	63.25	13.11	0.01	1.64	0.00
sun_sun07a	Sun-Sun M-DSP-Net-VDisp	1176.47	46.66	13.11	0.01	1.64	0.00
sun_sun08a	Sun-Sun D-DSP-Net-VDisp	1706.61	64.11	13.11	0.01	1.64	0.00

## Processing Rates (in Mbytes/second)

Network speed:	0.27
DSP-VIS speed:	0.02

Synchronous sun\_sun configuration (Buffsize=256, SNM=None)

Test Case: Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun_sunf01a Sun-Sun Memory-Net-Memory	49.19	9.33	13.11	0.27	1.64	0.03
sun_sunf02a Sun-Sun Disk-Net-Memory	47.04	12.03	13.11	0.28	1.64	0.03
sun_sunf03a Sun-Sun Memory-Net-Disp	140.87	9.53	13.11	0.09	1.64	0.01
sun_sunf04a Sun-Sun Disk-Net-Disp	141.36	11.25	13.11	0.09	1.64	0.01
sun_sunf05a Sun-Sun Mem-DSP-Net-Vis	609.41	48.16	13.11	0.02	1.64	0.00
sun_sunf06a Sun-Sun Disk-DSP-Net-Vis	896.52	67.01	13.11	0.01	1.64	0.00
sun_sunf07a Sun-Sun M-DSP-Net-VDISP	1179.31	47.91	13.11	0.01	1.64	0.0
0						
sun_sunf08a Sun-Sun D-DSP-Net-VDISP	1472.48	67.68	13.11	0.01	1.64	0.0
0						

## Processing Rates (in Mbytes/second)

Network speed:	0.27
DSP-VIS speed:	0.02

Synchronous sun\_sun (FDDI) configuration (Bufsize=256, SNM=None)



Test Case:	Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun_sun01b	Sun-Sun Memory-Net-Memory	22.04	7.77	13.11	0.59	1.64	0.07
sun_sun02b	Sun-Sun Disk-Net-Memory	22.57	9.50	13.11	0.58	1.64	0.07
sun_sun03b	Sun-Sun Memory-Net-Disp	23.93	7.52	13.11	0.55	1.64	0.07
sun_sun04b	Sun-Sun Disk-Net-Disp	23.46	9.22	13.11	0.56	1.64	0.07
sun_sun05b	Sun-Sun Mem-DSP-Net-Vis	75.26	63.80	13.11	0.17	1.64	0.02
sun_sun06b	Sun-Sun Disk-DSP-Net-Vis	93.05	81.98	13.11	0.14	1.64	0.02
sun_sun07b	Sun-Sun M-DSP-Net-VDisp	76.18	63.88	13.11	0.17	1.64	0.02
sun_sun08b	Sun-Sun D-DSP-Net-VDisp	93.56	81.86	13.11	0.14	1.64	0.02

## Processing Rates (in Mbytes/second)

Network speed:	0.59
DSP-VIS speed:	0.25

Synchronous sun\_sun configuration (Buffsize=16K, SNM=None)

Test Case: Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun_sunf01b Sun-Sun Memory-Net-Memory	13.66	6.88	13.11	0.96	1.64	0.12
sun_sunf02b Sun-Sun Disk-Net-Memory	13.68	8.75	13.11	0.96	1.64	0.12
sun_sunf03b Sun-Sun Memory-Net-Disp	14.24	6.93	13.11	0.92	1.64	0.12
sun_sunf04b Sun-Sun Disk-Net-Disp	15.82	8.65	13.11	0.83	1.64	0.10
sun_sunf05b Sun-Sun Mem-DSP-Net-Vis	87.88	83.25	13.11	0.15	1.64	0.02
sun_sunf06b Sun-Sun Disk-DSP-Net-Vis	91.38	86.90	13.11	0.14	1.64	0.02
sun_sunf07b Sun-Sun M-DSP-Net-VDISP	79.48	78.21	13.11	0.16	1.64	0.02
sun_sunf08b Sun-Sun D-DSP-Net-VDISP	91.62	86.71	13.11	0.14	1.64	0.02

Processing Rates (in Mbytes/second)

-----  
 Network speed: 0.96  
 DSP-VIS speed: 0.18

**Synchronous sun\_sun (FDDI) configuration (Buffsize=16K, SNM=None)**

Test Case:	Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun_sun01c	Sun-Sun Memory-Net-Memory	18.30	7.38	12.58	0.69	1.57	0.09
sun_sun02c	Sun-Sun Disk-Net-Memory	23.73	9.57	12.58	0.53	1.57	0.07
sun_sun03c	Sun-Sun Memory-Net-Disp	20.92	7.35	12.58	0.60	1.57	0.08
sun_sun04c	Sun-Sun Disk-Net-Disp	22.41	9.08	12.58	0.56	1.57	0.07
sun_sun05c	Sun-Sun Mem-DSP-Net-Vis	78.46	68.90	12.58	0.16	1.57	0.02
sun_sun06c	Sun-Sun Disk-Net-Vis	96.24	86.21	12.58	0.13	1.57	0.02
sun_sun07c	Sun-Sun M-DSP-Net-VDISP	79.90	70.40	12.58	0.16	1.57	0.02
sun_sun08c	Sun-Sun D-DSP-Net-VDISP	96.55	86.63	12.58	0.13	1.57	0.02

## Processing Rates (in Mbytes/second)

Network speed:	0.69
DSP-VIS speed:	0.21

Synchronous sun\_sun configuration (Buffsize=128K, SNM=None)

Test Case: Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun_sunf01c Sun-Sun Memory-Net-Memory	13.22	6.55	12.58	0.95	1.57	0.12
sun_sunf02c Sun-Sun Disk-Net-Memory	12.60	8.05	12.58	1.00	1.57	0.12
sun_sunf03c Sun-Sun Memory-Net-Disp	13.66	6.40	12.58	0.92	1.57	0.12
sun_sunf04c Sun-Sun Disk-Net-Disp	14.97	7.82	12.58	0.84	1.57	0.11
sun_sunf05c Sun-Sun Mem-DSP-Net-Vis	91.75	88.13	12.58	0.14	1.57	0.02
sun_sunf06c Sun-Sun Disk-Net-Vis	96.33	92.66	12.58	0.13	1.57	0.02
sun_sunf07c Sun-Sun M-DSP-Net-VDisp	91.69	88.01	12.58	0.14	1.57	0.02
sun_sunf08c Sun-Sun D-DSP-Net-VDisp	96.38	92.86	12.58	0.13	1.57	0.02

## Processing Rates (in Mbytes/second)

Network speed:	0.95
DSP-VIS speed:	0.16

Synchronous sun\_sun (FDDI) configuration (Bufsize=128K, SNM=None)

**B.2****CRAY-SUN NETWORKED TEST RESULTS**

The following test reports were run using synchronous processing. These results may be used for comparison to the asynchronous results listed in Appendix A. The reports are listed in order of buffer size.

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray_sun01a	Cray-Sun Memory-Net-Memory	1281.38	15.82	13.11	0.01	1.64	0.00
cray_sun02a	Cray-Sun Disk-Net-Memory	1282.24	20.93	13.11	0.01	1.64	0.00
cray_sun03a	Cray-Sun Memory-Net-Disp	1282.29	15.76	13.11	0.01	1.64	0.00
cray_sun04a	Cray-Sun Disk-Net-Disp	1281.63	21.23	13.11	0.01	1.64	0.00
cray_sun05a	Cray-Sun Mem-DSP-Net-Vis	1284.32	26.32	13.11	0.01	1.64	0.00
cray_sun06a	Cray-Sun Disk-DSP-Net-Vis	1346.67	21.31	13.11	0.01	1.64	0.00
cray_sun07a	Cray-Sun M-DSP-Net-VDISP	1293.58	16.20	13.11	0.01	1.64	0.00
cray_sun08a	Cray-Sun D-DSP-Net-VDISP	1584.03	22.25	13.11	0.01	1.64	0.00

Processing Rates (in Mbytes/second)

Network speed:	0.01
DSP-VIS speed:	4.46

**Synch. cray\_sun configuration (Buffsize=256, SNM=None, CPUS=2)**

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray_sunf01a	Cray-Sun Memory-Net-Memory	47.06	14.02	13.11	0.28	1.64	0.03
cray_sunf02a	Cray-Sun Disk-Net-Memory	47.01	19.96	13.11	0.28	1.64	0.03
cray_sunf03a	Cray-Sun Memory-Net-Disp	154.43	13.82	13.11	0.08	1.64	0.01
cray_sunf04a	Cray-Sun Disk-Net-Disp	154.98	19.67	13.11	0.08	1.64	0.01
cray_sunf05a	Cray-Sun Mem-DSP-Net-Vis	574.97	14.22	13.11	0.02	1.64	0.00
cray_sunf06a	Cray-Sun Disk-DSP-Net-Vis	857.89	15.15	13.11	0.02	1.64	0.00
cray_sunf07a	Cray-Sun M-DSP-Net-VDisp	1283.73	15.62	13.11	0.01	1.64	0.00
cray_sunf08a	Cray-Sun D-DSP-Net-VDisp	1568.32	15.09	13.11	0.01	1.64	0.00

Processing Rates (in Mbytes/second)

Network speed:	0.28
DSP-VIS speed:	0.02

**Synch. cray\_sun (FDDI) configuration (Buffsize=256, SNM=None, CPUS=2)**

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray_sun01b	Cray-Sun Memory-Net-Memory	24.45	5.96	13.11	0.54	1.64	0.07
cray_sun02b	Cray-Sun Disk-Net-Memory	30.69	8.94	13.11	0.43	1.64	0.05
cray_sun03b	Cray-Sun Memory-Net-Disp	35.36	5.96	13.11	0.37	1.64	0.05
cray_sun04b	Cray-Sun Disk-Net-Disp	38.78	6.20	13.11	0.34	1.64	0.04
cray_sun05b	Cray-Sun Mem-DSP-Net-Vis	37.49	4.98	13.11	0.35	1.64	0.04
cray_sun06b	Cray-Sun Disk-DSP-Net-Vis	36.47	3.97	13.11	0.36	1.64	0.04
cray_sun07b	Cray-Sun M-DSP-Net-VDisp	43.65	6.43	13.11	0.30	1.64	0.04
cray_sun08b	Cray-Sun D-DSP-Net-VDisp	44.42	6.62	13.11	0.30	1.64	0.04

## Processing Rates (in Mbytes/second)

Network speed:	0.54
DSP-VIS speed:	1.01

Synch. cray\_sun configuration (Buffsize=16K, SNM=None, CPUS=2)



Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray_sunf01b	Cray-Sun Memory-Net-Memory	9.58	2.53	13.11	1.37	1.64	0.17
cray_sunf02b	Cray-Sun Disk-Net-Memory	9.49	2.80	13.11	1.38	1.64	0.17
cray_sunf03b	Cray-Sun Memory-Net-Disp	14.32	2.47	13.11	0.92	1.64	0.11
cray_sunf04b	Cray-Sun Disk-Net-Disp	14.53	2.74	13.11	0.90	1.64	0.11
cray_sunf05b	Cray-Sun Mem-DSP-Net-Vis	22.24	3.51	13.11	0.59	1.64	0.07
cray_sunf06b	Cray-Sun Disk-DSP-Net-Vis	23.17	4.10	13.11	0.57	1.64	0.07
cray_sunf07b	Cray-Sun M-DSP-Net-VDisp	33.88	4.46	13.11	0.39	1.64	0.05
cray_sunf08b	Cray-Sun D-DSP-Net-VDisp	33.40	7.00	13.11	0.39	1.64	0.05

## Processing Rates (in Mbytes/second)

Network speed:	1.37
DSP-VIS speed:	1.04

Synch. cray\_sun (FDDI) configuration (Buffsize=16K, SNM=None, CPUS=2)

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray_sun01c	Cray-Sun Memory-Net-Memory	19.50	5.65	12.58	0.65	1.57	0.08
cray_sun02c	Cray-Sun Disk-Net-Memory	19.09	5.99	12.58	0.66	1.57	0.08
cray_sun03c	Cray-Sun Memory-Net-Disp	27.55	5.43	12.58	0.46	1.57	0.06
cray_sun04c	Cray-Sun Disk-Net-Disp	23.86	5.69	12.58	0.53	1.57	0.07
cray_sun05c	Cray-Sun Mem-DSP-Net-Vis	26.63	9.05	12.58	0.47	1.57	0.06
cray_sun06c	Cray-Sun Disk-DSP-Net-Vis	25.27	6.81	12.58	0.50	1.57	0.06
cray_sun07c	Cray-Sun M-DSP-Net-VDISP	26.41	4.54	12.58	0.48	1.57	0.06
cray_sun08c	Cray-Sun D-DSP-Net-VDISP	25.01	6.58	12.58	0.50	1.57	0.06

## Processing Rates (in Mbytes/second)

Network speed:	0.65
DSP-VIS speed:	1.76

Synch. cray\_sun configuration (Bufsize=128K, SNM=None, CPUS=2)

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray_sunf01c	Cray-Sun Memory-Net-Memory	13.30	2.32	12.58	0.95	1.57	0.12
cray_sunf02c	Cray-Sun Disk-Net-Memory	9.19	2.50	12.58	1.37	1.57	0.17
cray_sunf03c	Cray-Sun Memory-Net-Disp	14.83	2.28	12.58	0.85	1.57	0.11
cray_sunf04c	Cray-Sun Disk-Net-Disp	14.25	2.45	12.58	0.88	1.57	0.11
cray_sunf05c	Cray-Sun Mem-DSP-Net-Vis	16.69	3.97	12.58	0.75	1.57	0.09
cray_sunf06c	Cray-Sun Disk-DSP-Net-Vis	14.37	6.01	12.58	0.88	1.57	0.11
cray_sunf07c	Cray-Sun M-DSP-Net-VDISP	16.56	5.15	12.58	0.76	1.57	0.09
cray_sunf08c	Cray-Sun D-DSP-Net-VDISP	15.62	3.85	12.58	0.81	1.57	0.10

## Processing Rates (in Mbytes/second)

Network speed:	0.95
DSP-VIS speed:	3.71

Synch. cray\_sun (FDDI) configuration (Bufsize=128K, SNM=None, CPUS=2)

**B.3****CONVEX-SUN NETWORKED TEST RESULTS**

The following test reports were run using synchronous processing. These results may be used for comparison to the asynchronous results listed in Appendix A. The reports are listed in order of buffer size.

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cvx_sun01a	Cvx-Sun Memory-Net-Memory	58.00	11.40	13.11	0.23	1.64	0.03
cvx_sun02a	Cvx-Sun Disk-Net-Memory	54.75	14.42	13.11	0.24	1.64	0.03
cvx_sun03a	Cvx-Sun Memory-Net-Disp	154.53	11.38	13.11	0.08	1.64	0.01
cvx_sun04a	Cvx-Sun Disk-Net-Disp	154.98	14.42	13.11	0.08	1.64	0.01
cvx_sun05a	Cvx-Sun Mem-DSP-Net-Vis	566.48	16.23	13.11	0.02	1.64	0.00
cvx_sun06a	Cvx-Sun Disk-DSP-Net-Vis	1028.21	19.38	13.11	0.01	1.64	0.00
cvx_sun07a	Cvx-Sun M-DSP-Net-VDisp	1285.53	16.38	13.11	0.01	1.64	0.00
cvx_sun08a	Cvx-Sun D-DSP-Net-VDisp	1738.50	19.63	13.11	0.01	1.64	0.00

## Processing Rates (in Mbytes/second)

Network speed:	0.23
DSP-VIS speed:	0.03

Synch. cvx\_sun configuration (Buffsize=256, SNM=None)

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cvx_sunf01a	Cvx-Sun Memory-Net-Memory	45.38	11.27	13.11	0.29	1.64	0.04
cvx_sunf02a	Cvx-Sun Disk-Net-Memory	46.07	14.27	13.11	0.28	1.64	0.04
cvx_sunf03a	Cvx-Sun Memory-Net-Disp	157.36	11.27	13.11	0.08	1.64	0.01
cvx_sunf04a	Cvx-Sun Disk-Net-Disp	155.05	14.40	13.11	0.08	1.64	0.01
cvx_sunf05a	Cvx-Sun Mem-DSP-Net-Vis	575.42	16.13	13.11	0.02	1.64	0.00
cvx_sunf06a	Cvx-Sun Disk-DSP-Net-Vis	1036.93	19.42	13.11	0.01	1.64	0.0
0							
cvx_sunf07a	Cvx-Sun M-DSP-Net-VDISP	1287.03	16.22	13.11	0.01	1.64	0.0
0							
cvx_sunf08a	Cvx-Sun D-DSP-Net-VDISP	1748.98	19.40	13.11	0.01	1.64	0.0
0							

## Processing Rates (in Mbytes/second)

Network speed:	0.29
DSP-VIS speed:	0.02

Synch. cvx\_sun (FDDI) configuration (Buffsize=256, SNM=None)

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cvx_sun01b	Cvx-Sun Memory-Net-Memory	38.83	5.25	13.11	0.34	1.64	0.04
cvx_sun02b	Cvx-Sun Disk-Net-Memory	38.05	5.32	13.11	0.34	1.64	0.04
cvx_sun03b	Cvx-Sun Memory-Net-Disp	35.20	4.87	13.11	0.37	1.64	0.05
cvx_sun04b	Cvx-Sun Disk-Net-Disp	34.48	4.97	13.11	0.38	1.64	0.05
cvx_sun05b	Cvx-Sun Mem-DSP-Net-Vis	41.66	9.05	13.11	0.31	1.64	0.04
cvx_sun06b	Cvx-Sun Disk-DSP-Net-Vis	41.14	9.27	13.11	0.32	1.64	0.04
cvx_sun07b	Cvx-Sun M-DSP-Net-VDISP	45.67	8.88	13.11	0.29	1.64	0.04
cvx_sun08b	Cvx-Sun D-DSP-Net-VDISP	8.34	4.68	13.11	1.57	1.64	0.20

## Processing Rates (in Mbytes/second)

Network speed:	0.34
DSP-VIS speed:	4.63

Synch. cvx\_sun configuration (Buffsize=16K, SNM=None)

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cvx_sunf01b	Cvx-Sun Memory-Net-Memory	11.93	3.68	13.11	1.10	1.64	0.14
cvx_sunf02b	Cvx-Sun Disk-Net-Memory	12.15	3.78	13.11	1.08	1.64	0.13
cvx_sunf03b	Cvx-Sun Memory-Net-Disp	16.40	3.65	13.11	0.80	1.64	0.10
cvx_sunf04b	Cvx-Sun Disk-Net-Disp	15.64	3.73	13.11	0.84	1.64	0.10
cvx_sunf05b	Cvx-Sun Mem-DSP-Net-Vis	20.63	7.80	13.11	0.64	1.64	0.08
cvx_sunf06b	Cvx-Sun Disk-DSP-Net-Vis	20.41	7.92	13.11	0.64	1.64	0.08
cvx_sunf07b	Cvx-Sun M-DSP-Net-VDISP	30.33	7.65	13.11	0.43	1.64	0.05
cvx_sunf08b	Cvx-Sun D-DSP-Net-VDISP	31.33	7.77	13.11	0.42	1.64	0.05

## Processing Rates (in Mbytes/second)

Network speed:	1.10
DSP-VIS speed:	1.51

**Synch. cvx\_sun (FDDI) configuration (Buffsize=16K, SNM=None)**



Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cvx_sun01c	Cvx-Sun Memory-Net-Memory	25.61	5.27	12.58	0.49	1.57	0.06
cvx_sun02c	Cvx-Sun Disk-Net-Memory	25.11	5.32	12.58	0.50	1.57	0.06
cvx_sun03c	Cvx-Sun Memory-Net-Disp	30.60	5.22	12.58	0.41	1.57	0.05
cvx_sun04c	Cvx-Sun Disk-Net-Disp	29.85	5.25	12.58	0.42	1.57	0.05
cvx_sun05c	Cvx-Sun Mem-DSP-Net-Vis	28.45	9.85	12.58	0.44	1.57	0.06
cvx_sun06c	Cvx-Sun Disk-DSP-Net-Vis	29.35	9.85	12.58	0.43	1.57	0.05
cvx_sun07c	Cvx-Sun M-DSP-Net-VDisp	30.87	9.85	12.58	0.41	1.57	0.05
cvx_sun08c	Cvx-Sun D-DSP-Net-VDisp	30.50	9.80	12.58	0.41	1.57	0.05

## Processing Rates (in Mbytes/second)

Network speed:	0.49
DSP-VIS speed:	4.43

Synch. cvx\_sun configuration (Buffsize=128K, SNM=None)

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cvx_sunf01c	Cvx-Sun Memory-Net-Memory	12.31	3.53	12.58	1.02	1.57	0.13
cvx_sunf02c	Cvx-Sun Disk-Net-Memory	11.37	3.55	12.58	1.11	1.57	0.14
cvx_sunf03c	Cvx-Sun Memory-Net-Disp	16.04	3.47	12.58	0.78	1.57	0.10
cvx_sunf04c	Cvx-Sun Disk-Net-Disp	15.94	3.52	12.58	0.79	1.57	0.10
cvx_sunf05c	Cvx-Sun Mem-DSP-Net-Vis	13.91	8.15	12.58	0.90	1.57	0.11
cvx_sunf06c	Cvx-Sun Disk-DSP-Net-Vis	16.70	8.08	12.58	0.75	1.57	0.09
cvx_sunf07c	Cvx-Sun M-DSP-Net-VDISP	18.42	8.12	12.58	0.68	1.57	0.09
cvx_sunf08c	Cvx-Sun D-DSP-Net-VDISP	17.76	8.08	12.58	0.71	1.57	0.09

## Processing Rates (in Mbytes/second)

Network speed:	1.02
DSP-VIS speed:	7.86

Synch. cvx\_sun (FDDI) configuration (Buffsize=128K, SNM=None)

**B.4****SAMPLE DISK READ RATE RESULTS**

The following test runs provide sample disk read rates for initial file reads before caching took effect. Refer to test case 2 for the initial file read times. Subsequent file reads in these test runs will show the effect of disk caching.

Test Case:	Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
sun01b	Sun Memory-Memory	1.40	1.20	13.11	9.37	1.64	1.17
sun02b	Sun Disk-Memory	9.48	3.35	13.11	1.38	1.64	0.17
sun03b	Sun Memory-Disk	7.24	6.95	13.11	1.81	1.64	0.23
sun04b	Sun Disk-Disk	10.14	10.03	13.11	1.29	1.64	0.16
sun05b	Sun Mem-DSP-Mem	63.19	62.63	13.11	0.21	1.64	0.03
sun06b	Sun Disk-DSP-Mem	83.56	82.76	13.11	0.16	1.64	0.02
sun07b	Sun Mem-DSP-Disk	69.46	68.38	13.11	0.19	1.64	0.02
sun08b	Sun Disk-DSP-Disk	87.22	86.71	13.11	0.15	1.64	0.02
sun09b	Sun Mem-Null-Mem	2.65	2.23	13.11	4.94	1.64	0.62
sun10b	Sun Disk-NULL-Mem	9.62	4.28	13.11	1.36	1.64	0.17
sun11b	Sun Mem-Null-Display	32.76	26.92	13.11	0.40	1.64	0.05
sun12b	Sun Mem-VIS-Display	12.71	4.03	13.11	1.03	1.64	0.13
sun13b	Sun Mem-VIS-Mem	5.51	2.30	13.11	2.38	1.64	0.30
sun14b	Sun Disk-VIS-Mem	9.69	3.92	13.11	1.35	1.64	0.17
sun15b	Sun Mem-VIS-Display	50.38	2.25	13.11	0.26	1.64	0.03
sun16b	Sun Disk-VIS-Display	51.51	3.88	13.11	0.25	1.64	0.03
sun17b	Sun Memory-Socket-Memory	11.65	8.42	13.11	1.13	1.64	0.14
sun18b	Sun Disk-Socket-Memory	14.34	10.37	13.11	0.91	1.64	0.11
sun21b	Sun Mem-DSP-Socket-Vis	86.89	69.71	13.11	0.15	1.64	0.02
sun22b	Sun Disk-DSP-Socket-Vis	112.04	88.76	13.11	0.12	1.64	0.01
sun23b	Sun Mem-DSP-Sckt-Vis-Disp	127.87	73.85	13.11	0.10	1.64	0.01
sun24b	Sun Disk-DSP-Sckt-Vis-Disp	169.62	96.93	13.11	0.08	1.64	0.01

## Processing Rates (in Mbytes/second)

Memory transfer speed: 9.37  
 Disk read speed: 1.38  
 Disk write speed: 1.81  
 DSP processing speed: 0.21  
 VIS processing speed: 3.19

This run shows a  
 realistic initial disk read rate  
 (no caching)

Test results for sun configuration (Buffsize=16K, SNM=None)

Test Case:	Description	Actual Time	CPU Time	Total Mbytes	Rate (MBPS)	Total Msamp	Rate (MSPS)
cray01b	Cray Memory-Memory	0.09	0.06	13.11	141.33	1.64	17.67
cray02b	Cray Disk-Memory	8.84	0.36	13.11	1.48	1.64	0.19
cray03b	Cray Memory-Disk	6.00	1.35	13.11	2.18	1.64	0.27
cray04b	Cray Disk-Disk	1.06	0.64	13.11	12.40	1.64	1.55
cray05b	Cray Mem-DSP-Mem	3.29	3.17	13.11	3.99	1.64	0.50
cray06b	Cray Disk-DSP-Mem	3.68	3.57	13.11	3.56	1.64	0.44
cray07b	Cray Mem-DSP-Disk	4.70	4.00	13.11	2.79	1.64	0.35
cray08b	Cray Disk-DSP-Disk	3.94	3.59	13.11	3.32	1.64	0.42

## Processing Rates (in Mbytes/second)

Memory transfer speed: 141.33  
 Disk read speed: 1.48  
 Disk write speed: 2.18  
 DSP processing speed: 4.10  
 VIS processing speed: 0.00

This run shows a  
 realistic initial disk  
 read rate (no caching)

Asynchronous cray configuration (Bufsize=16K, SNM=None, CPUS=2)

Test Case:	Description	Actual Time	CPU Time	Total Mbyte	Rate (MBPS)	Total Msamp	Rate (MSPS)
cvx01a	Cvx Memory-Memory	0.73	0.37	13.11	18.03	1.64	2.25
cvx02a	Cvx Disk-Memory	6.05	3.53	13.11	2.17	1.64	0.27
cvx03a	Cvx Memory-Disk	9.26	3.55	13.11	1.42	1.64	0.18
cvx04a	Cvx Disk-Disk	13.96	6.33	13.11	0.94	1.64	0.12
cvx05a	Cvx Mem-DSP-Mem	6.04	5.33	13.11	2.17	1.64	0.27
cvx06a	Cvx Disk-DSP-Mem	13.72	8.70	13.11	0.96	1.64	0.12
cvx07a	Cvx Mem-DSP-Disk	15.63	9.10	13.11	0.84	1.64	0.10
cvx08a	Cvx Disk-DSP-Disk	20.53	11.57	13.11	0.64	1.64	0.08
cvx09a	Cvx Mem-Null-Mem	302.71	7.63	13.11	0.04	1.64	0.01
cvx10a	Cvx Disk-NULL-Mem	255.97	7.67	13.11	0.05	1.64	0.01
cvx11a	Cvx Mem-Null-Display	622.83	6.67	13.11	0.02	1.64	0.00
cvx12a	Cvx Disk-Null-Display	610.72	7.00	13.11	0.02	1.64	0.00
cvx13a		0.00	0.00	0.00	0.00	0.00	0.00
cvx14a		0.00	0.00	0.00	0.00	0.00	0.00
cvx15a		0.00	0.00	0.00	0.00	0.00	0.00
cvx16a		0.00	0.00	0.00	0.00	0.00	0.00
cvx17a	Cvx Memory-Socket-Memory	7.03	2.90	13.11	1.86	1.64	0.23
cvx18a	Cvx Disk-Socket-Memory	11.41	6.23	13.11	1.15	1.64	0.14
cvx19a	Cvx Memory-Socket-Display	7.57	3.07	13.11	1.73	1.64	0.22
cvx20a	Cvx Disk-Socket-Display	12.37	6.18	13.11	1.06	1.64	0.13
cvx21a	Cvx Mem-DSP-Socket-Vis	13.89	8.13	13.11	0.94	1.64	0.12
cvx22a	Cvx Disk-DSP-Socket-Vis	19.22	11.47	13.11	0.68	1.64	0.09
cvx23a	Cvx Mem-DSP-Sck-Vis-Disp	12.98	8.25	13.11	1.01	1.64	0.13
cvx24a	Cvx Disk-DSP-Sck-Vis-Disp	19.05	11.53	13.11	0.69	1.64	0.09

## Processing Rates (in Mbytes/second)

Memory transfer speed: 18.03  
 Disk read speed: 2.17  
 Disk write speed: 1.42  
 DSP processing speed: 2.47  
 VIS processing speed: -17.96

This run shows an  
 initial disk read rate  
 (no caching)

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